APR 30 1923

Railway Age

FIRST HALF OF 1923—No. 21 NEW YORK - APRIL 28, 1923—CHICAGO SIXTY-EIGHTH YEAR

Published weekly by Simmons-Boardman Pub. Co., 30 Church St., New York, N. Y. Subscription Price U. S., Canada and Mexico, $6.00; foreign countries (excepting daily editions), $8.00, and $10.00 a year including all dailies; single copies, 25c. Entered as second-class matter January 30, 1918, at the post office at New York, N. Y., under the act of March 3, 1879.

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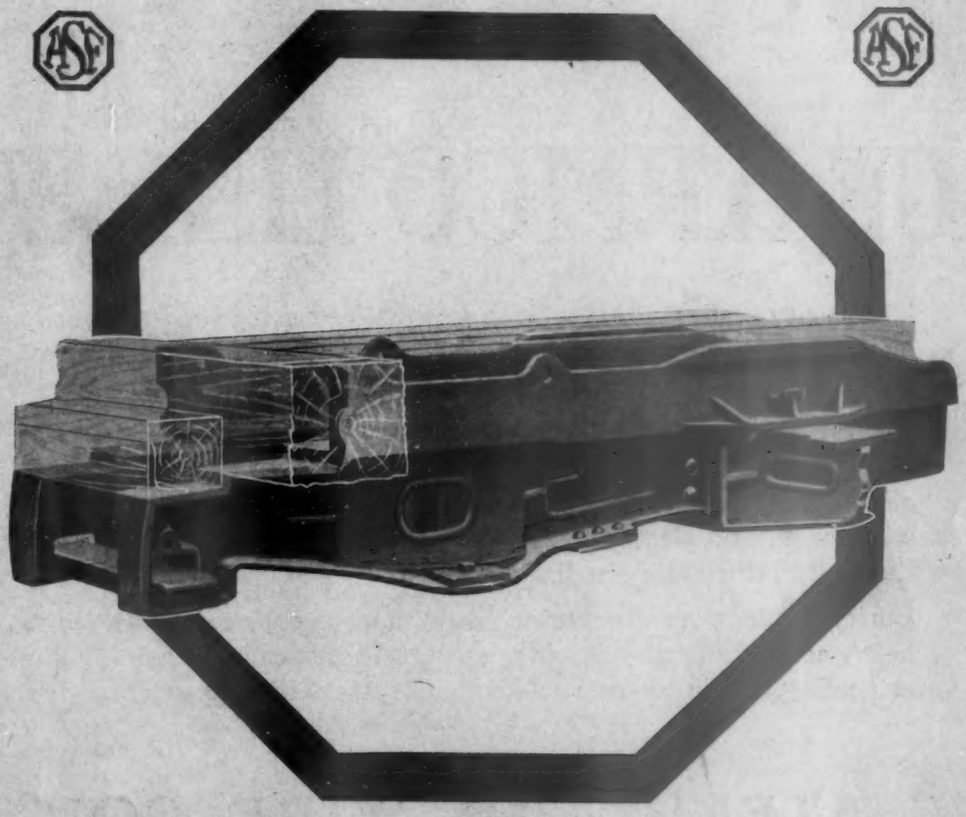

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EDITORIAL

Railway Age

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"Learn to Arbitrate!" is the slogan of the Arbitration Society of America which has been formed to displace much unnecessary litigation by arbitration. Arbitration provides a means for deciding questions of fact rather than questions of law and is accomplished by the disputants presenting their own cases to a tribunal of experts on the subject in hand. In most states arbitration can be resorted to, but if either of the disputants dislike the way the case is progressing, they can withdraw and the case must then be settled by litigation. A law has been enacted in New York State which makes the decision of arbitration tribunals binding and the effect of this law has been to make the value of arbitration at once apparent. Cases which might have dragged on for years in the courts, until perhaps one of the disputants had spent all his money, have been settled quickly, and in other instances when a decision to arbitrate was reached, the cases were settled out of court and not even brought before the tribunal. Speedy decisions of this kind are now assisting greatly to relieve the badly congested calendars of the New York courts. Uniform arbitration acts are needed in all states and those who have had occasion to drag cases through lengthy and expensive litigation will undoubtedly be interested in the aims and activities of the Arbitration Society of America, 115 Broadway, New York.

Learn to Arbitrate

In a fatal rear-end collision recently investigated by the Interstate Commerce Commission (Alexis, Ohio, February 3) it appeared that a freight train crew had left their train standing on the main track, unprotected, for about two hours; and that one of the reasons given for this negligence was a feeling among the men that, having been on duty 16 hours, they were liable to prosecution in the federal court, with possible imprisonment, if they were to lift a finger in the performance of their usual duties! Commenting on this collision, an officer of another road, a prominent western line, makes some significant observations concerning the 16-hour law. He says that cases in which trainmen have an opportunity thus to act on their foolish fears of imaginary legal terrors are not uncommon. To comply strictly with the rule, a train sometimes has to be stopped on the main track within two or three miles of a terminal. Literal compliance is then impossible, as flagmen must go out in both directions and remain perhaps an hour or two. Such an emergency may or may not be such that the overwork is easily justified as excusable under the law. It is plain, says our correspondent, speaking from many years' experience, that the time-limit ought to be 18 hours. The majority of freight train division points are so far apart that a period of 16 hours leaves a good many emergencies unprovided for; and changing the location of terminals is a costly process. This idea seems eminently reasonable; for to work eighteen hours is not to be looked upon as a severe strain, in *real emergencies*. Such a limit (as the extreme) should, however, be accompanied by a lower limit as the normal work day. This would be necessary as a check on those greedy trainmen and short-sighted officers who, for a few dollars in money or to avoid some inconvenience, are willing to make the extreme hours the ordinary hours. Everyone knows that the normal work period ought to be 12 hours or less. It is equally obvious that the extreme limit ought to be a good deal more than 12, but accompanied by a suitable incentive or penalty tending to induce everybody constantly to seek to conform to a reasonable work day.

Experiences with the 16-Hour Law

The Northern Pacific, which has demonstrated definite savings of coal by delivering train orders to heavy freight trains without requiring them to be stopped at the telegraph office, now presents data showing a very material saving in overtime from the same cause; more than from saving coal. The figures are given in a letter, printed in another column, from E. W. Weston, who, while necessarily using estimates and not any mathematical proof, states the case in a convincing way. At all events, a record—even an imperfect record—of a saving of $5,000 a day on 5,000 miles of road is a direct challenge to every road making extensive use of Form 31 to see whether any flaw can be picked in the Northern Pacific record. Do not those figures mean $1,000 a day, on 1,000 miles of road; $500 a day on 500 miles? And there are 365 days in the year. Mr. Weston's report of his questionnaire is also a challenge; a challenge to every manager or other officer whose duty it is to use the whip on committees. This question of economy by the use of Form 19 has been a live one now for several years; yet here we see a very familiar record of slow committee work. Road *A* would "take the plunge" but its lines are unimportant; that is, the saving would not be large. Road *B* has a rule formulated, but the officers are still discussing. Road *C* has a committee report but has got no farther. By the way, why should modern educated railroad officers look upon the Northern Pacific as having taken "a plunge"?

Thousands Saved by the Use of Form 19

The railways are now facing the heaviest traffic in their history. All indications point to a business which will tax their facilities to the utmost. The extent to which they will meet the demands for transportation will depend upon the intensiveness with which their facilities are used. Unlike the one-horse shay, the capacity of a railway division or system is commonly fixed by restrictions at one or more local points —by the number of cars that can be put through some terminal or the number of trains which can be handled over a particular section of track. If relief can be secured at such points, the capacity of a division or of the entire railway may be increased. With conditions such as those now existing, it is the course of ordinary prudence to search for and to relieve the points of congestion as far as possible. This is not as simple a matter as would seem at first glance, for frequently the effects of limitations of capacity are reflected far from the source of the trouble, and the apparent cause may not be the true one. Because of this fact, it is important that analyses of the traffic capacities of the various railway units be made promptly to determine where congestion will first develop and how relief can be secured in order

Look Now for Congestion Points

that measures may be taken to remove the limitations so far as may be possible in the time available. While it is not advisable for the roads to subordinate their larger and more comprehensive projects, it is important that they anticipate and remove all limitations of their capacity that are possible of ready remedy in order that they may handle the maximum amount of traffic this fall.

A Constructive Railroad Policy

PREDICTIONS are frequently made that consideration of railway legislation will consume most of the time of Congress during its next session. We can understand why radicals who are seeking the destruction of private ownership and the adoption of a policy of regulation that will accomplish this object should say this. It is also said, however, by persons who are opposed to radical and destructive regulation and government ownership. They seem to agree with the radicals on one thing—namely, that there exist bad railroad conditions which can be remedied only by more and early federal legislation. The *Railway Age* does not understand how they reach this conclusion.

The railroad situation, in many respects, is unsatisfactory. The worst feature of it is the inability of the roads to render enough freight service. How could more legislation cause provision of more adequate service? S. Davies Warfield, president of the National Association of Railway Security Owners, is seeking the establishment of a vast system of pooling the ownership and distribution of freight cars. He says his plan would abolish the "car shortage." We have never read or heard an argument that supports this view. There is no reason whatever for believing the distribution of cars would be more equitable or efficient under the Warfield plan than it is now, under the direction of the American Railway Association. The advocates of the Warfield plan claim it would reduce operating expenses many millions of dollars annually, but they have never stated a fact or presented an argument in support of this view that is the least convincing to us. They claim it would make it easier for the railways to finance the purchase of equipment. But the easiest thing for the railways to finance now is the purchase of equipment. The main things the advocate of the Warfield plan have done thus far are to create the impression that there is a division of opinion among railway officers regarding the solution of the problem presented by the shortage of transportation, and to divert many people, including numerous public men, from helping secure adoption of the only plan by which the problem can be solved. There is nothing more astounding in the whole situation than that financial concerns in Wall street that own large amounts of railway securities continue to support Mr. Warfield in a propaganda which is seriously hindering the solution of the railroad problem and is contrary to the interest of every owner of railroad securities.

There is only one practical way to remedy the shortage of transportation. This is to increase the net return earned by the railways and reestablish their credit so that they can sell more securities and raise more capital. As we have said, the easiest thing for the railways to finance at present is the purchase of new equipment. This is because they can issue equipment trust securities which are a direct lien upon the equipment bought, and if a railway does not pay the interest and principal as they come due, the owners of these securities can seize the equipment and sell it to some other railway. The most difficult of all railroad problems at present is that of getting new capital with which to build new lines and tracks, and enlarge yards, stations and other permanent structures. Capital in substantial amounts for these purposes must be raised by the sale of stock or bonds. Hardly any railway can at present sell stock. Few can issue bonds at reasonable rates of interest, and, anyway, it is highly undesirable for most of them to issue more bonds and thereby increase their fixed charges. But it is useless to increase equipment without making corresponding increases in trackage and terminal facilities.

The railways have made appropriations of about 700 million dollars for the purchase of equipment this year, and for the expenditure of about 400 million dollars for permanent improvements. Even allowing for the large amount of this equipment, which will be bought for replacements, it is plain that the ratio of the proposed expenditures for other improvements to the proposed expenditures for equipment is entirely too small. An old rule of thumb is that to maintain the proper balance between different kinds of facilities the capital invested in other facilities should be three times as great as that invested in equipment. This relationship between capital expenditures is not being anywhere maintained. The reason is, that while it is comparatively easy for most railways to finance the purchase of equipment, it is impossible for most of them to raise needed capital for other purposes. Not even a real beginning will be made in remedying the shortage of transportation until the railways can raise more new capital for the enlargement of terminals and other permanent improvements.

Why can they not raise the capital needed for these purposes? Simply because they have not been and are not now earning enough net operating income to pay reasonable dividends and interest on existing bonds and stocks, much less on large additional issues of bonds and stocks.

The fundamental question, then, is how to increase the net return. That is the heart of the railroad problem. Getting sufficient net return is the vital problem in every business. The amount of net return earned in every business makes the difference between prosperity and bankruptcy, between progress and stagnation, between expansion and stoppage of development. This is as true of the railroad as of every other business, although it is commonly legislated about and regulated as if the ordinary laws of economics do not apply to it.

While an increase in the net return of the railways is the one indispensable requisite to the solution of the transportation problem, nobody says anything about legislation for this purpose. Many advocate legislation to limit or reduce the net return, but nobody advocates legislation to increase it. There is no reason for saying anything about legislation to increase it, because the laws already in effect are sufficient for that purpose. If the provisions of the Transportation Act were left in effect and administered in the spirit in which they were enacted, the railways probably would soon become able to earn an adequate average net return. What is an adequate net return? Under present financial and transportation conditions it certainly is not less than the 5¾ per cent on the valuation which the Interstate Commerce Commission has held "fair." Within the last three years the railways have received a net return about $1,250,000,000 less than the commission itself has held fair. A "fair return," according to the plain meaning of the Transportation Act, is a return sufficient as an average in periods of years to give the railroads a credit that will enable them, under honest, efficient and economical operation, to furnish the country adequate transportation. If the existing rate-making provisions of the Transportation Act should be kept in effect and the commission should allow the railways, on an average, to earn a net return for some years to come of around six per cent, real progress would be made in solving the railroad problem. That would be a really constructive policy.

For many years public sentiment opposed almost every consolidation of railways. Within recent years a large part of the public has reversed itself and regards gigantic consolidations as essential to the solution of the railroad problem. It believes vast economies would be effected by such

consolidations. The old policy of trying to prevent every consolidation that would affect competition was wholly unsound. On the other hand, we are not enamored of the new policy of wholesale consolidations. We believe there are many consolidations that should be effected. But whether two or more railways should be consolidated depends upon conditions in their territory and the situation of these particular railways. There is no merit whatever in the current theory that advantages will be gained merely by increasing the size of railway systems. We have never seen or heard any evidence that a railroad system of 25,000 miles can, merely because it is larger, be more efficiently and economically managed than one of 5,000 miles.

Many of the advocates of consolidations seem to think that they should be effected before the railways are allowed to begin to earn a reasonable net return and as a means of effecting economies that will enable them to earn it. But it will take a long time to consolidate all the railways into a few big systems, if it is ever done. If, in the meantime, the railways are not allowed to earn an adequate average net return, the real solution of the railroad problem will be postponed. If, after big consolidations were made, the savings expected from them were not realized, the delay in letting the railways begin earning a fair net return until they were made would be a net loss. On the other hand, if big consolidations finally were made and did result in large savings, any excess over a reasonable return that they then enabled the railways to earn could be wiped out at that time by reductions of rates.

Absolutely opposed to the adoption of a policy which in any way would be constructive are the reactionary politicians calling themselves "progressives," who desire to make progress backward by repealing the rate-making provisions of the Transportation Act. They would withdraw from the Interstate Commerce Commission the instructions given to it by Congress in these provisions to take into consideration in fixing rates the need of the country for adequate transportation. They would restore the state railroad commission's power to fix state rates that were unremunerative; and some of them would pass legislation that would so reduce the valuation of the railroads and reduce and limit their net return as to bankrupt a large part of the companies and absolutely stop railroad expansion. Styling themselves, and even being called by other persons, "progressives," they ignorantly, or with the deliberate object of destroying private ownership, advocate the most reactionary, confiscatory and destructive policy ever proposed for dealing with any industry in this country.

The Interstate Commerce Commission is our principal railway regulating body. It is charged, among other duties, with that of recommending to Congress such railroad legislation as it considers desirable in the public interest. What it does not recommend and what it recommends indicate what legislation the commission believes should not be adopted and what it believes should be adopted in furtherance of a constructive policy. The recommendations made by it appear in its annual reports. The following is the legislation recommended by it in its last annual report, that for December 1, 1922: (1) That any person giving, or railway employee receiving money or anything of value, to influence car service, be made punishable. (2) That the Boiler Inspection Act be amended to provide for increases in the number and salaries of inspectors. (3) That, with appropriate exceptions, the use of steel cars in passenger trains be required, and that the use of wooden cars between or in front of steel cars be prohibited. (4) That certain amendments be made to the Hours of Service Act. (5) That the commission's appropriations be made adequate. (6) That Section 20-A of the Interstate Commerce Act be made to apply to electric railways handling freight. (7) That the Transportation Act be amended to provide whether and, if so, how, voluntary consolidations of railways may be effected pending adoption by the commission of a complete plan of consolidation. (8) That it be made unnecessary for common carriers by water in foreign commerce to file, and for the commission to publish, certain information. (9) That certain changes be made in the Merchant Marine Act of 1920.

This is all. Not one single important change in the present federal railroad laws is advocated. The commission is composed of eleven men appointed from all parts of the country. Only one of them is a former railway officer. Five of them were formerly members of the state railroad commissions of Wisconsin, Kentucky, New Jersey, Oregon and Indiana. They represent the entire public. By not recommending any important changes in present laws the commission indicates that it is opposed to them now. By what, it does not say, as well as by what it says, it agrees with the view we have expressed—namely, that what is needed to solve the railroad problem is not new legislation, but a further trial and proper administration of the laws we already have.

The country needs a constructive railroad policy. But why should anybody who accepts this premise jump to the conclusion that new legislation is needed? Legislation may be destructive, as well as constructive. Most of the legislation now being advocated would be reactionary and destructive. President Harding said in a speech at Des Moines in the political campaign of 1920 that the Transportation Act was the most constructive piece of railway legislation ever enacted. It has been tried under abnormal conditions for three years. It is now being tried for the first time under conditions that approach normal, and probably the most constructive thing that could be done would be to give it a trial at least as long under normal conditions as it has been given under abnormal conditions.

We believe that if this, and this alone, were done, more real progress would be made toward the solution of the railroad problem during the next three years than has been made in the entire time since effective government regulation was begun seventeen years ago.

What Is Essential?

WHILE THE PRESENT PERIOD of industrial expansion bears a striking resemblance to the corresponding months of 1920, there is one notable difference and that arises from an indelible recollection of the intervening period of deflation. Instead of regaling himself in the steady upward march of prices, the seller today manifests concern lest further advances will bring about the much feared buyer's strike. There has been, in fact, a distinct leaning toward curtailed activities, as exemplified in Secretary Hoover's proposal to suspend public improvements, the object being both to lessen the current demand for material and labor, which are now clearly inadequate for current requirements, and to provide a reservoir of construction activities which can be let loose whenever the demands in other lines were lessened.

It is suggested by some that this principle be applied as well to projects financed by individuals or corporations, which naturally gives rise to conflicting opinions as to what may or may not be considered non-essential projects. Thus we find housing, industrial expansion and road construction, each set up as of prime importance by their advocates, while others present equally forcible arguments for curtailing or suspending these particular activities. In very few quarters, however, is there any criticism of the efforts being made by the railroads to increase their traffic carrying capacities, for it is generally conceded that railroad facilities must be expanded. Therefore, if any system of priorities is to be set up with respect to railway projects it must come from the

managements of the roads, but even as regards this—the question is not what should be done, or what should not be done, but what must be done *first*.

Railway officers responsible for the prosecution of improvement projects are confronted with serious shortages of labor and harassing delays in material deliveries. A late spring has also set back the construction programs, and studies of progress show that it will be exceedingly difficult to maintain the completion schedules that have been set up. What then is the criterion to follow in prosecuting the work with the means at hand? The best answer would seem to be found in the operating program of the American Railway Association which points to a maximum demand on the railroads beginning with the first week of October. Any improvements which will be of direct benefit in handling the record business then expected should be completed first. All other work should follow in due course, especially improvement to facilities essential to the conduct to winter transportation.

The Freight Rate "Embargo" on Fruits and Vegetables

THE *Railway Age* often has emphasized the fact that the only things about the railroad business that are stranger than the fictions spread about regarding it are the facts about it. Of all these fictions and facts, none are more surprising, perhaps, than the fictions and the facts regarding the effects that have been produced by freight rates within the last two years upon the shipments of farm products.

It has been repeatedly asserted, until many people believe it, that high freight rates have operated as an "embargo" upon the shipment of farm products. In answer to this it has been shown by incontrovertible statistics that the total carloads of grain and livestock actually shipped in 1921 and 1922 were in each of these years larger than in any previous year in history.

The fact that high freight rates did not operate as an embargo upon these farm products having been thus established, those who purport to criticize freight rates for the farmers have concentrated their attacks upon the effects alleged to have been produced by high freight rates upon shipments of fruits and vegetables. For example, Senator Arthur Capper, in his Kansas Farmer for April 7, said: "Grain, it may be said, is not considered a perishable commodity by farmers. It can be held for shipment. But thousands of acres of the finest apples, peaches, melons, onions, cabbages, and potatoes that this country ever produced did rot where they grew last year and the year before, because high freight rates and low prices did not make it pay to gather them." The plain implication of this statement is that because of high freight rates there have been actual reductions in the quantity shipped of the farm products mentioned.

What are the facts? The statistics of the American Railway Association show that in both 1921 and 1922 there were large increases in the total shipments of all fruits and vegetables. The number of carloads of fruits and vegetables shipped in carlots in 1920 was 640,068. In 1921 it was 731,875, and in 1922 it was 798,997, an increase in two years of 25 per cent. How about the exact products that Senator Capper mentions? There was a decline in 1921, and again in 1922, in the number of carloads of apples shipped. There were increases in both 1921 and 1922 in the number of carloads of peaches, cantaloupes, watermelons, onions, cabbages, sweet potatoes and white potatoes shipped. In other words, there were increases in the shipments of all but one of the products that Senator Capper mentions.

There are 22 different kinds of fruits and vegetables, statistics regarding the shipments of which, within the last three years, are available. Of these the shipments of 17 increased in both 1921 and 1922. These 17 fruits and vegetables are cabbage, cantaloupes, celery, grapes, grapefruit, lettuce, mixed vegetables, mixed deciduous fruits, onions, peaches, pears, spinach, strawberries, sweet potatoes, tomatoes, watermelons and white potatoes.

There has been an especially loud outcry in the west because, as has been charged, the price of potatoes has been so low and the freight rates so high that it has been impossible to ship a large part of those grown. In June, 1920, the average farm price of potatoes, according to reports of the Department of Agriculture, was 606 per cent higher than in 1913. In other words, if in that year the total crop of potatoes had been just as large as in 1913, the producers would have received over seven times as much for it as they did for their crop in 1913. In 1922 the farm price of potatoes averaged slightly lower than in 1913. In other words, it was only about one-seventh as much as in 1920. Freight rates on potatoes, as well as other commodities, were higher in 1922 than in 1920. Therefore, on the theory that freight rates play a large part in determining whether a particular farm product can and will be shipped, the total shipments of potatoes in 1922 should have been much smaller than in 1920. But, as we have already stated, the facts about railroad matters are stranger than fiction. The facts about potatoes are that in 1920 the total shipments of both sweet and white potatoes were 191,773 cars, while in 1922, they were 260,836 carloads, an increase of 31 per cent. The case of the humble tuber has been used more than any other to show how high freight rates have operated as an "embargo" upon the shipments of farm products, and yet the facts show that on the rates in effect in 1922 almost one-third more potatoes were actually transported to market than under the lower rates in effect in 1920.

This very great increase in the shipments of potatoes demonstrates one thing conclusively. This is that there was an extremely large increase in the amount of potatoes produced. This large increase in production, of course, explains the great decline in the market price. The price declined so greatly because the supply of potatoes increased much more than the demand. The fact that 31 per cent more potatoes actually were transported by the railways from the farms to the markets demonstrates that the freight rate did not operate as an "embargo." The facts that there were such a great increase in production and such a great decline in the price prove that the real reason why potatoes could not be sold at a profit was not that freight rates on them were high, but that over-production caused a decline in the price which would have rendered it impossible to sell them at a profit if no freight rate at all had had to be paid on them.

The facts regarding the increase in the actual shipments of other fruits and vegetables explain why other prices declined, and they could not be sold at a profit. The increase between 1920 and 1922 in the shipments of peaches was almost 50 per cent. The increase in the shipments of tomatoes was over 75 per cent. The increase in the shipments of strawberries was 120 per cent. The shipments of spinach almost doubled. Of course, prices are likely to decline when there are such increases in production of specific products as these increases in shipments indicate. But the railroads are not responsible for losses incurred by producers caused by declines of prices brought about by over-production, and to demand that freight rates shall be reduced with the result of causing losses to the railways merely to save producers from the effects of mistakes made by themselves in overestimating the market for their products is unjust and absurd. The adoption of such a policy would, in the long run, be ruinous to the railways and would be of no real benefit to those in whose interest it is advocated.

Letters to the Editor

Form 19 and the Three-Position Train-Order Signal

ST. PAUL, Minn.

TO THE EDITOR:

The approval, by the American Railway Association of the use of Form 19 for train orders, together with the advantages and safety of that form, as shown by the discussions in the *Railway Age* last year, justify the elimination of Form 31. Then why is the use of Form 19 not more general?

To learn whether these discussions had led to the further adoption of Form 19 for restricting purposes, I put the question to officials of three large systems operating in different parts of the country.

A reply from an eastern line which also has large mileage in Canada, says: "The articles on the subject of 19 form train order created quite a favorable impression on our people, and I am satisfied that if all our heavy traffic lines were not double tracked, we should not hesitate to take the plunge and use the 19 train order the same as you are doing."

A reply from a southwestern line says that rules for the use of Form 19 had been prepared, but as yet they had not been put in effect, because of discussion between operating heads, who were not entirely agreed.

The western line said a committee to consider the subject had just submitted a recommendation of two plans,—one to eliminate entirely Form 31, and another which makes only four exceptions where Form 31 should be used.

An official of the Alaska Railway has written asking information as to how the Northern Pacific uses Form 19 and has requested a copy of the rules on the subject.

With such a showing of interest I believe we may feel that the articles were well worth while.

As additional argument in favor of Form 19, permit me to quote some overtime figures. It has been demonstrated (*Railway Age*, Feb. 18, 1922, p. 418) that on twelve divisions, Form 19 effected a saving in fuel of $2,516 daily, this being a very conservative figure. A later study shows that on the same twelve divisions, during a ten-day period, an average of 217 trains earned daily in overtime 776 hours, equivalent to $3,693, or $4.76 an hour.

As stated in a previous article, the use of Form 31 causes an average of at least five additional stops to each freight train moving over a division; and each stop means at least 30 minutes delay. Hence, if Form 31 were used, it would mean an additional delay of two and one-half hours to each of the 217 trains already earning overtime.

Is it not reasonable to say that, if Form 31 were used, at least twelve more trains (one to each division) would be earning overtime? This would mean two and one-half hours each for 229 trains, a total of 572½ hours. At $4.76 an hour, then, we save daily on overtime $2,725.10 because we are using Form 19 train orders instead of Form 31. Adding to this the daily saving on coal of $2,516, we have a total of $5,241.10 saved by the use of Form 19.

Is it not strange that more roads do not take advantage of Form 19, in view of its proved economy and safety?

The three-position train-order signal is essential in getting maximum results from the use of the 19 order. It is authorized on the Northern Pacific by the following rule:

> When an operator receives a signal "31" or "19" followed by the direction, he must immediately display the "Stop Signal" or "Caution Signal" for the direction indicated, and then reply "Stop Signal" or "Caution Signal" adding the direction; and until the orders have been delivered or annulled, the signal must not be restored to "proceed." While "Stop" or "Caution" is indicated, trains must not proceed without a clearance card form "A."
>
> Where the semaphore is used, the governing arm is displayed to the right of the signal mast as seen from an approaching train, and indicates "Stop" when horizontal, "Caution" when diagonally upward, and "Proceed" when vertical or diagonally downward; and on double track covers trains moving against the current of traffic the same as if they were moving with the current of traffic.

With this signal, we say to the approaching train one of three things:

1st position—Stop for train orders.
2nd position—Get train orders without stopping.
3rd position—There are no orders for your train.

Under the second or third position of the signal, trains may proceed without stopping if their train rights permit them to do so, and each position of the signal gives definite information to the approaching engineman as to what is expected of him at that office.

With the elimination of Form 31, the use of the first or stop position is required only when the train rights are restricted at that station. With the use of Form 19, when the signal is displayed in second position, the engineman knows before reaching the signal and before receiving the order that it is either an assisting order or one that restricts his rights at some station in advance.

We all recognize the wisdom of adopting standard code rules when possible. Considering the value of the three-position train-order signal, I have often wondered why the A. R. A. did not authorize it, and frame the necessary rules for its use.

E. W. WESTON,
Inspector of Train Dispatching, Northern Pacific Ry.

Creating Public Sentiment

BANGOR, Me.

TO THE EDITOR:

It seems clear that the future of the railroads will be made or marred by the effects of legislation, and legislation is, ultimately, nothing more than an expression, through Congress, of public sentiment. Therefore the creating of the right kind of public sentiment regarding the roads is of the utmost importance.

In a town where I once lived there was a man quite prominent in local affairs but who was inclined to be rather reactionary. He would nearly always be found opposing any modern scheme for civic betterment that might be current. In my conversation with a friend one day this gentleman's name was mentioned, and my friend remarked substantially as follows—"If I were away from here for some time and, coming back upon the eve of an election found some important question to be voted upon and had not time to investigate for myself, I should simply find out which side Mr. Blank was on and vote opposite."

Now is it possible that the average public citizen holds some such opinion of the railroad corporations? Some piece of legislation unfavorable to the roads comes up, it becomes known that they have a strong delegation at Washington fighting it, the citizen argues that if it be against the railway interests it must of necessity be favorable to the public good, since the two are diametrically opposed according to his process of thought, and he straightway lines up, actively or passively, in favor of the proposed law without thinking that his interest and that of the railways may lie in the same direction. If argument be attempted he will cite some past case of lobbying activity upon the part of the railroads that may, of, a truth, send up a most unsavory odor, and will judge accordingly.

But times have changed, and so has the attitude of most railroad corporations toward the public. There is now no good reason why the two interested parties should not see more nearly alike. The supporting, by the roads, of necessary activities in legislative matters ought not to act as a

boomerang. Views and ambitions regarding the future of the railroads are generally very thoroughly aired through the press, but the same is not true to any such extent in regard to the aims and ambitions of railroad management. Charges against the roads are made widely public, but what of the refutations? Are they not too apt to be addressed to a limited audience such as clubs, chambers of commerce, committees, etc., or published in technical and trade journals that are read by comparatively few?

We must somehow disabuse the public mind of the belief that all railways are huge and wealthy monopolies, stopping at nothing in order to gain still greater wealth and power, and in its place set up the conception of a great public servant that really intends to do right. The problem is to present the facts in such manner and through such mediums as to get to the man in the street. In order to do this the public press could be used more than it is through the publishing of short and readily understandable articles that will interest the ordinary reader, and there are great possibilities in broadcasting short speeches through radio.

Indications seem to point to a generally prosperous season just ahead for the roads, under the operation of the Transportation Act, and a well managed publicity campaign, free from "mudslinging," carried on during the next few months, could accomplish much. W. A. R.

The Possible False Clear Signal

San Francisco, Cal.

To the Editor:

I have read the letter by Mr. Fugina in your issue of March 24, page 798, but I cannot agree that the use of Form 19 for restricting the superiority of trains was or is brought about through the use of automatic signals. We are now using the 19 order to restrict trains on approximately 5,000 miles of single track railroads where there is not a single automatic block signal, and doing it with the same safety as if we used the 31 form. Other roads can do likewise if they will discard the old "bugaboo," make the right kind of rules for the purpose, and properly educate their employes on the rules.

When Mr. Fugina says he believes that his system eliminates the equality between a fast passenger train and a slow freight train of 75 or 100 cars I must again disagree with him. If the dispatcher figures that a freight train can be advanced against a high class passenger train on a 30 minute leeway and authorizes the move, does he not thus give the freight train absolute authority to go? And if owing to conditions unknown to the dispatcher, it takes 60 minutes, would it not delay the fast train? On the other hand, had he given the freight train 30 minutes time the engineman, knowing that it would require an hour, would have remained on the siding.

The automatic signal system is perhaps all right in its present state of efficiency for the purpose it was made, i.e., an additional safeguard, in case the human element fails. It will seldom, if ever, happen that a false clear indication will exist at the same time and place where the human element fails, and the signal system is fine to "catch 'em" when the rules are violated.

Considering the possibility of a false clear indication, which the signal engineer must admit exists—not frequently, but often enough to play havoc with our railroad if it were not for our rule and order system—and the additional cost of patching up the present signal system or installing an additional system for the purpose; and the added cost of labor to handle an elaborate system, I do not believe that the railroads of the country are yet ready for single track operation of trains by signals only.

William Nichols.

The Virtues of the Red Flag As an Order Board

Manhattan Transfer, N. J.

To the Editor:

Your editorial of April 7, on the Neglected Train-Order Signal is a very useful preachment. It is a timely reminder that in our craze for science and uniformity we have neglected some very simple and homely, but useful, instrumentalities—the red flag, for instance. The train-order signal has, indeed, been neglected; but it ought to be neglected. It ought to be abolished, I had almost said. When Mr. Sperry shall have perfected his move-trains-by-fixed-signals theory and has secured its general adoption, the train order signal will be an unnecessary superfluity. What a relief it will be to get rid of the numerous and varied monstrosities which still linger in front of the stations of certain well-known railroads which have prided themselves on their originality and have encouraged "home talent" (through the patent office) but which now are simply standing in the way of progress.

The hand flag has numerous virtues. As a train-order signal it has the advantage that, at small expense, it can be always fixed in a position under the eye of the operator; that is, in front of his window and not too high to be seen without special effort, while yet it is in the best possible position to be seen by the engineman. The red flag, when new, is in some respects better than a blade, or disk or board. Some critic will attack my argument by observing that most flags are dirty, dark and dull; but that is not an indictment that hits me; it should remind superintendents to attend to the simple duty of providing flags which are really red. There was considerable common sense in the former practice on some roads—perhaps it still persists—of requiring flagmen to always have bright flags, about 30 in. square, or larger.

The idea of a five position signal—or any device moving into more than three positions—represents nothing more than the effort of some ambitious signal engineer to do everything by machinery, whether he is able to do it reasonably and economically or not. Or, perhaps I should say the shortsighted ambition or effort to do everything that the operating officer wants to have done. To tell that officer to use a flag and a lantern instead of calling on the signal engineer for an impossible combination of post, arms and lights, may seem unprofessional or even unscientific; but it may be horse sense, nevertheless.

The use of more than three indications is of questionable wisdom even when (as suggested by you) the arrangement is such that they are not all shown on the same post. Conservative railroad civil engineers have reminded us, now and then, all along through the years, that Stop, Caution and Proceed are all that can be used profitably; and though their advice has been ignored, it still has merit. Wherever you find diagonally upward and diagonally downward both prescribed for the same signal (vertical meaning clear and horizontal meaning stop) you will find nice distinctions in definition which are of very questionable value. Ask the locomotive runners.

Everybody ought to work for the limitation of signal indications to three, wherever possible. I like Mr. Rudd's idea of simplifying automatic block signaling by allowing all automatics to be used just as we use "tonnage" signals. That would simplify the use of the pointed-blade semaphore, and there is no doubt that with reasonable discipline it would work out satisfactorily. It would still be true that we should have four indications, for the horizontal square-end blade and the horizontal pointed end would never mean the same thing; but nobody has ever found any fault with this distinction. V. P. O. Jr.

D. & H. Freight Yard at Carbondale, Pa.

Early History of the Delaware & Hudson Co.

Organized to Mine and Distribute Anthracite—Active Railroad Development Began in 1867

THE DELAWARE & HUDSON COMPANY on April 23 celebrated the hundredth anniversary of its incorporation by an act of the legislature of the state of New York, April 23, 1823. The company came into existence as the result of the efforts of the Wurts brothers, members of a prosperous firm of clothing manufacturers in Philadelphia, to sell in New York the anthracite or "stone coal," as it was then called, which they had prospected for in the upper valley of the Lackawanna river in Pennsylvania.

The original purpose behind the forming of the company and the purpose which shaped its course for many years was the mining and distribution of anthracite from northeastern Pennsylvania to the state of New York; and, as a natural development, to considerable portions of New England and Canada lying to the east and northeast of New York.

Until 1867 the D. & H. continued primarily as a canal company so far as its transportation functions were concerned, its only rail line being its gravity railroad. Actually, the canal very soon began to operate as a common carrier for freight and, to some extent, for passengers. The records for 1830 show that it carried, among other commodities: 6,012 tons of merchandise; 3,383 tons of water cement; 1,255 tons of manufactured lumber; 75,022 cords of wood; 3,793,000 feet of lumber. This miscellaneous traffic was additional to its own coal transportation, which totalled 43,200 tons or 1,706 boat loads. With this coal "388 sail of vessels" were loaded for cities and towns on the Hudson, in New Jersey and the eastern states.

The construction of the company's gravity railroad was commenced in 1827 and completed in 1829. This line was

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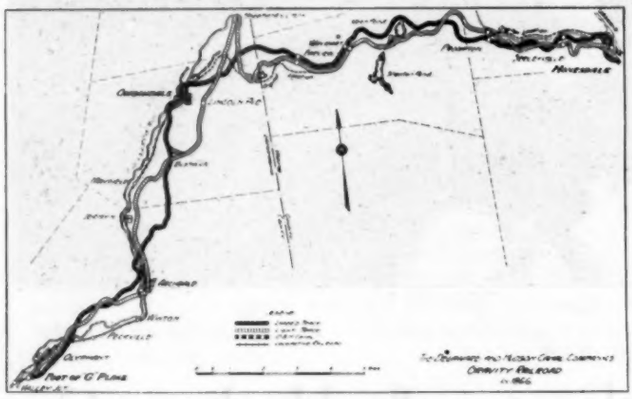
On the Delaware & Hudson Canal in the Old Days

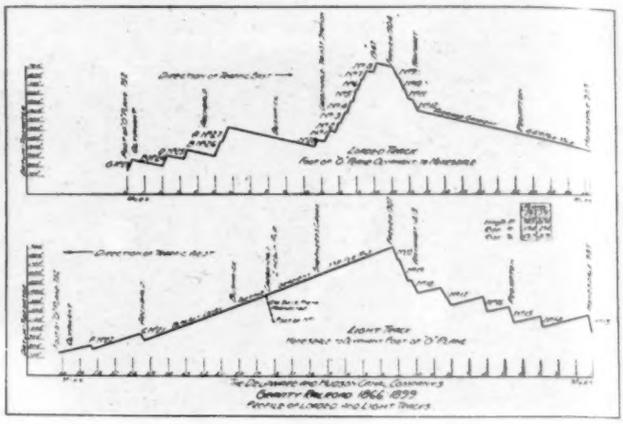
built between Carbondale and Honesdale, Pa., and consisted of a series of inclined planes up which the cars were hauled by cables. Horses supplied the motive power on this line in large part for a number of years. The first load of coal passed over the line on October 9, 1829. It was upon this line that the first steam locomotive ever used on the American continent was tried out, this being the trial trip of the "Stourbridge Lion" made on August 8, 1829.

The gravity road, as it was known for many years, was re-

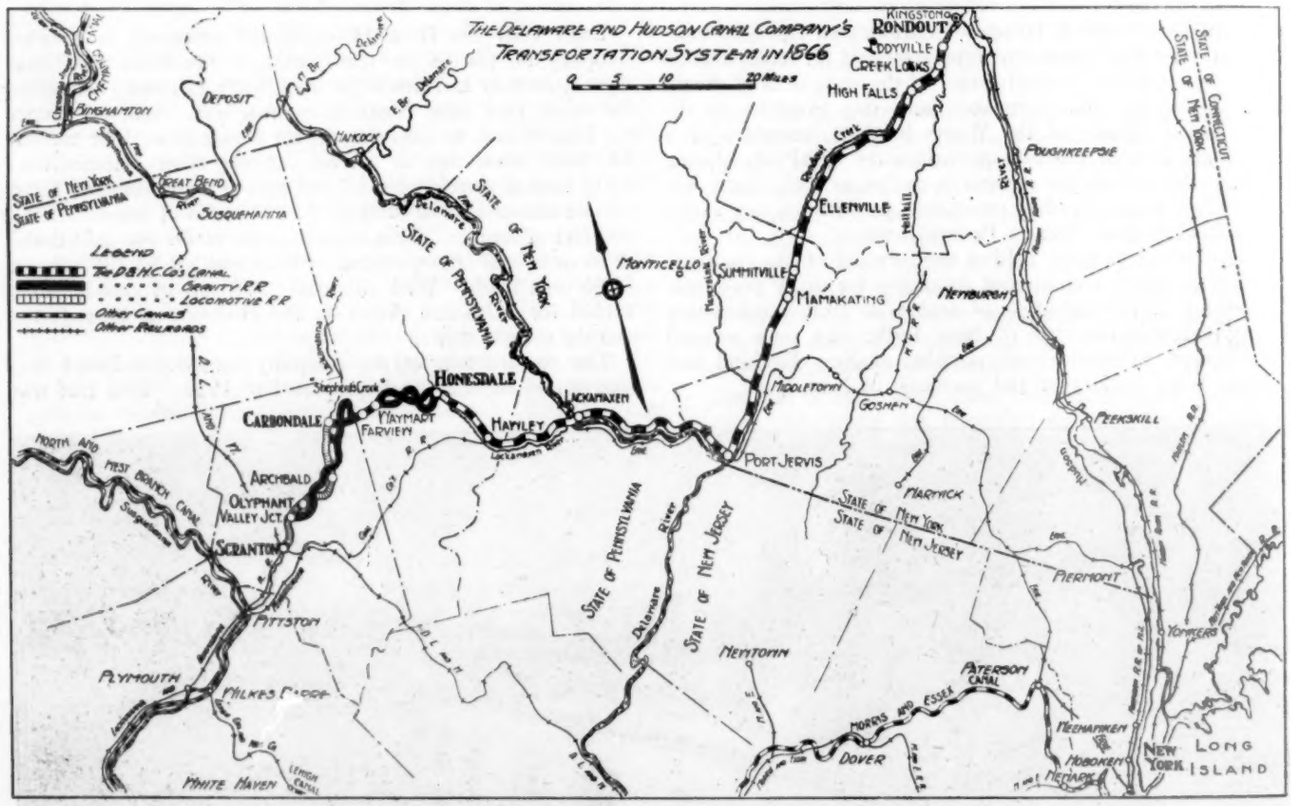


Map of Gravity Road

located and improved in 1832 and in 1846 it was practically rebuilt on revised locations of the inclines and a second track was added on an independent line with necessary inclines, one track being used for loaded and the other for empty movement. Other modifications were made from time to time, but the gravity road continued in existence as such and was used for both freight and passenger business until 1899 when it was very largely rebuilt and the gage widened to 4 ft. 8½ in., the former gage being 4 ft. 3 in., and regular operation by steam locomotives was commenced. The company extended its gravity road southward from Carbondale along the Lackawanna valley in 1846, to a point near Archbald, Pa., where additional coal lands had been purchased and in 1858 it was extended to a point known as Valley Junction, near Olyphant, Pa. The road was further extended to Providence in 1861 and to Green Ridge in 1863, these last two extensions being operated by locomotives. A portion of the final extensions is now the Vine street branch in the city of Scranton. The Poplar street branch, in the same city, was partially built in 1867 and completed some time prior to 1877.

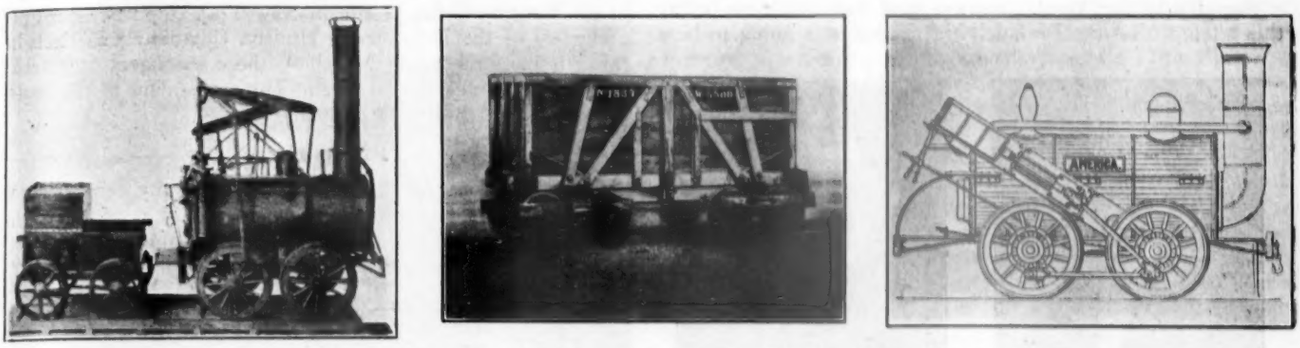


Profile of Gravity Railroad


THE DELAWARE AND HUDSON CANAL COMPANY'S TRANSPORTATION SYSTEM IN 1866
0 5 10 20 Miles
LEGEND
The D & H. Co's Canal
Gravity R.R.
Locomotive R.P.
Other Canals
Other Railroads
KINGSTON
RONDOUT
ROSENDALE
ROSENDALE
ROSENDALE

own and maintain railroads within this state, to contract with any railroad corporation now existing or hereafter to be created, for the use of its road, for the transportation of coal, to lease the railroad or any part thereof to any incorporated company now or hereafter to be created, upon which said canal company may desire to transport coal, and, also, to subscribe for and take stock or bonds of and in any railroad company which they may lease, or with which they may contract, now existing or hereafter to be incorporated . . ." The new powers were to be used subject to the General Railroad Law of 1850.

By this act, the D. & H. assumed the additional legal character of a railroad company, and from this beginning dates its interest in railroad construction, but more especially in the leases by which it has acquired and now operates its line from a little south of Wilkes-Barre in Pennsylvania, entering New York state a little east of Binghamton, and then continuing with sundry branch lines to Albany, Troy, Rutland and along the west side of Lake Champlain to the Canadian border, from which latter point its affiliated Canadian road—the Quebec, Montreal & Southern—extends as far north along the St. Lawrence as Quebec. As a natural consequence of its operation of this railroad line, its primitive function as merely a coal carrier has been enlarged to include general freight transportation and a comparatively large passenger business.



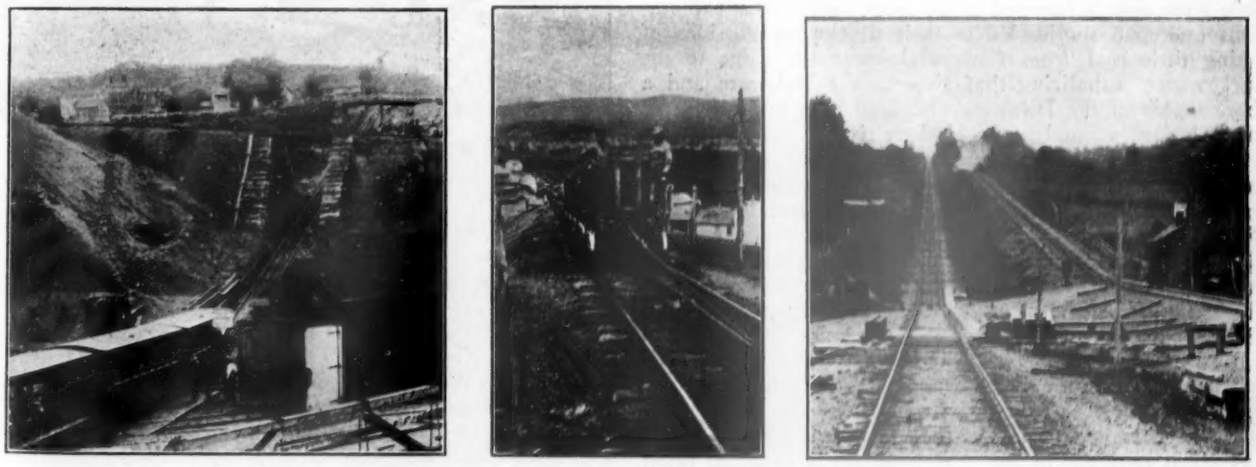
The "Stourbridge Lion," a Car on the Gravity Road and the "America"

In the early days of the Delaware & Hudson, anthracite had just come into use and its value was not generally appreciated. Fifteen years before the founding of the company it was, for all commercial purposes, unknown.

It was not until after the war of 1812 that the value of anthracite began to be seriously appreciated. Up to the beginning of that war bituminous coal had been imported from England, and this English bituminous, together with wood and charcoal, were the only fuels for what manufacturing plants there then were in the United States. Not only did the war of 1812 interrupt for a time the importation of soft coal, but when importations were partially renewed the prices were excessively high. It was about this time that a little anthracite was brought into Philadelphia from the nearer deposits, from which it could be floated down the Schuylkill river. The scantiness of the early production of anthracite is shown by an entry in the diary of Philip Hone, first president of the D. & H., who noted, in November, 1839, that the whole quantity of anthracite sent to the market in 1820 was 365 tons, from Lehigh. He gave the total production in 1839 as over 1,000,000 tons.

Pioneering in Anthracite

Beginning their search for anthracite apparently about 1814, the Wurts brothers, William and Maurice, had to undergo nearly 10 years of arduous and sometimes rather costly pioneering before their scheme took on the actual promise of fulfilment. The rugged country of the upper Lackawanna was heavily forested and very scantily settled, and in their search for outcroppings of anthracite and their attempt to locate areas promising to supply large quantities of it they put up with what might well be called frontier hardships of life.



Some of the Inclines on the Old Gravity Railroad

They seem to have mined as early as 1816 a small quantity of anthracite which they were unable to get to market. About 1822 they reached the site of the present town of Carbondale, gave it that name and made their settlement there, bought some coal lands and opened a rude mine which later became

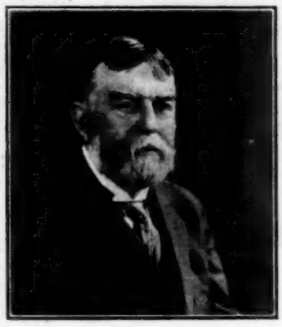
the nucleus of the first mines of the Delaware & Hudson Company. By the autumn of that year they had mined at Carbondale nearly 1,000 tons of anthracite.

The following winter, that of 1822-23, they succeeded in getting some of this coal to Philadelphia, carrying it part of the way on sleds and the rest of the way by rafts on the Lackawaxen and Delaware rivers—about 100 tons of it in all. They sold their coal, but seemed to have found that the market was already more efficiently supplied with Lehigh coal, the first shipments of which had come to the city in 1820.

Looking Towards New York

Apparently the Wurts brothers had realized even before this attempt that the Philadelphia market was going to be a

Philip Hone



L. F. Loree

difficult one for them to reach and that they would also meet there the competition of the Lehigh and Schuylkill coal at a great disadvantage to their own product, so that before the opening of 1823 they began to consider how they could reach the New York market. To the east of Carbondale there is a ridge 858 feet above the city of Carbondale on the west and 550 feet above Honesdale on the Lackawaxen river, which flows into the Delaware. In casting their eyes towards New York, the Wurts brothers discovered that New York was little more than a hundred miles away, and sundry explorations and map studies led to their developing the idea of taking their coal from Carbondale over the ridge to the Lackawaxen, canalizing that river to the Delaware and a short stretch of the Delaware also, and then building from the Delaware a canal to the Hudson river.

Realizing that any such undertaking as this would be too much for their own resources, the Wurts brothers prepared maps of their coal properties around Carbondale and the relation of those fields to the Hudson river, and circulated these in influential business circles in New York City, hoping by this means to enlist support for their project. They also secured from the Pennsylvania legislature, on March 13, 1823, the passage of an act which authorized Maurice Wurts and others to canalize the Lackawaxen river.

This right to improve the Lackawaxen, together with possession of their coal lands, gave them something with which to approach New York financial interests, and although there was much criticism of the suggestion for a canal to bring their coal to New York the idea of canals was nevertheless in high favor in most quarters and they secured enough support to produce a petition to the New York legislature and the granting of the original charter of the Delaware & Hudson Company in 1823.

That same year they engaged Benjamin Wright, who had been the chief engineer of the Erie canal, to make a survey of the line of the proposed canal from the Hudson river to the Delaware. Mr. Wright recommended a route, together with details of construction, and estimated the cost at about $1,300,000. Under Mr. Wright's plans, the canal would furnish a highway from the Hudson to Honesdale on the Lackawaxen, and the ridge between Honesdale and Carbondale, under Wright's plan, was to be crossed by a railway. When built later, this was the famous gravity railroad.

Further legislation by the state of Pennsylvania authorized the Delaware & Hudson Company to acquire the rights of the Wurts brothers in the canalizing of the Lackawaxen river, and the whole project was then in a state to present to investors.

It was not until January, 1825, that subscription books to the company's stock were opened in New York, in the Tontine Coffee House, at the northwest corner of Wall and Water streets, and at two other places. The capital stock of $1,500,000 was quickly over-subscribed. On March 8, 1825, again at the Tontine Coffee House in New York, the first board of managers of the Delaware & Hudson Company was elected, thirteen in number; on March 9, these managers organized and on March 11 elected Philip Hone president of the company and John Bolton treasurer.

Philip Hone

The election of Mr. Hone gave the company considerable prestige, for he was prominent in the business of the city, had acquired what was for those days a comfortable fortune, and had very wide and influential connections both socially

The D. & H. Bank at 13 Wall Street, New York

and politically. He had retired from active business in 1820 at the age of 40. At that time he lived in a house at No. 235 Broadway, near the corner of Park place. This is the site of the present Woolworth Building. In 1826 Mr. Hone served as mayor of the city of New York.

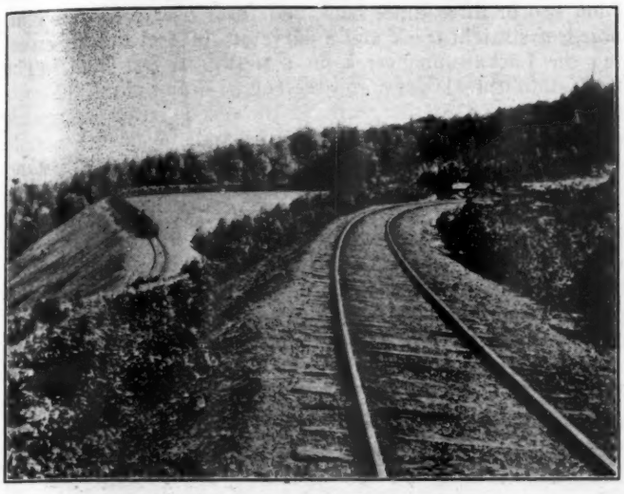
Until March, 1825, the Delaware & Hudson Company had no office in New York, but having been authorized by the legislature in the preceding November to use $500,000 of its capital in transacting a banking business, the company bought No. 13 Wall street and there opened the Delaware & Hudson Canal Company bank, at which the banking business was carried on until the expiration of the 20-year period set by the legislature, this termination coming in 1844. The banking house stood on the north side of Wall street just east of Nassau on the ground now covered by the United States sub-treasury. It was directly across the street from the present site of J. P. Morgan & Company's banking house.

By the winter of 1826-27 it began to be clear to the managers of the D. & H. that Mr. Wright's estimates of cost for the canal were too low, and it was then determined to ask the state of New York for aid. As the result of the company's appeal the act of March 10, 1827, authorized the issue of $500,000 of state stock in the canal company, for which

loan the company was to pay interest at the rate of 5 per cent. A second state aid, of $300,000, was authorized by the act of May 2, 1829, to carry interest at 4½ per cent. These two loans were repaid at their respective maturities, January 1, 1848, and January 1, 1850.

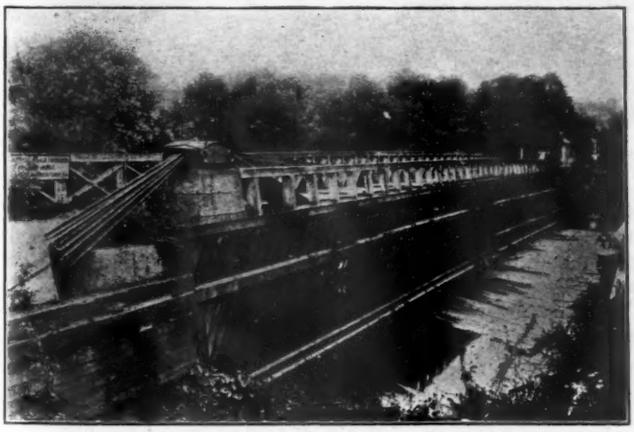
Building the Canal

Following the grant of the first piece of financial assistance of the state of New York, contracts for the entire length of the canal were let in April, 1827, and construction was energetically begun. The canal was completed in the autumn of 1828, and the first squadron of canal boats from Honesdale passed through the canal and arrived at Rondout, the Hudson river terminus, on December 5, 1828.



"Shepherd's Crook" on the Gravity Road

Passenger traffic on the canal was provided for by the building of two packetboats with accommodations for 20 passengers, meals being supplied on board. An advertisement of this service, which began October 7, 1829, as published in the New York Morning Courier and Inquirer, shows that the fare from the eastern terminus, near Kingston, to Honesdale, was $4.00. The charge for way passengers was 5 cents a mile. The westbound boat left the eastern terminus at 7.00 a. m. and the eastbound boat left Honesdale at 6.00 a. m., on Mondays, Wednesdays and Fridays, making the whole trip in 36 hours.



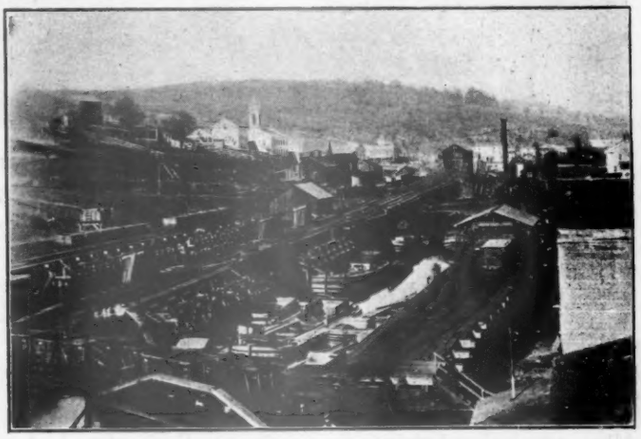
A Suspension Aqueduct on the D. & H. Canal

Physical Characteristics of the Gravity Railroad

The gravity railroad, by which coal was taken from Carbondale over the 858-foot ridge to the east and thence down to Honesdale on the Lackawaxen, where the coal was put aboard canal boats, consisted of a series of fairly steep inclines, alternating with level or slightly descending sections. These inclined planes were first constructed with a single track and turn-outs; but in the middle of each plane there was a stretch of 100 to 150 feet of double track so as to permit cars moving in the opposite direction to pass. These turn-outs were provided with self-acting switches, so that whenever a car passed out of the turn-out in either direction the switch was left in such a position as to turn the next car moving in the opposite direction into the side of the turn-out thus vacated. On the west side there were five long ascending planes with a stationary steam engine at the head of each plane. By means of a long chain extending the entire length of the plane these engines hauled up from three to five loaded cars (each car carrying about 1,500 lb. of coal), and, at the same time, letting down the same number of empty cars which were attached to the other end of the chain. On the eastern side of the ridge, for the descent towards Honesdale, the three descending planes were worked by the force of gravity, without the use of steam; the descending loaded cars drawing up the ascending empty cars attached to the other end of the chain, the velocity of their descent being controlled by the use of friction brakes on the shaft of a large upright fan-wheel, which thus furnished braking power by working against the resistance of the air. This original and simple scheme was at later times very much modified, the number of planes from Carbondale to the summit being later increased to eight.

In later years, as the company's mining operations were extended south to Carbondale, the gravity railroad was extended southward as far as Olyphant, and the eastbound, or loaded, and the westbound, or light, tracks were separated, so that in the later arrangement the loaded track had, on the east side, a single inclined plane into Honesdale something over 10 miles in length. The light track, or westbound track for empties, was re-located, taking advantage of the topography, so as to give a nearly uniform line of descent, on which the cars ran by gravity alone from the summit nearly to Archbald, south of Carbondale, in the Lackawanna valley, a distance of about 12 miles.

Beginning in the summer of 1860, there was a small beginning of passenger transportation over the gravity railroad in the Lackawanna valley, and in later years this developed greatly, the trip over the ridge being considered quite an excursion.



Old Rail-Canal Terminal at Honesdale

The "America"

Steam locomotives, then unknown in America, were to have hauled loaded cars down and empty cars up the very flat slopes of the descending planes, and these were planned in the first layout of the gravity railroad by the chief engineer,

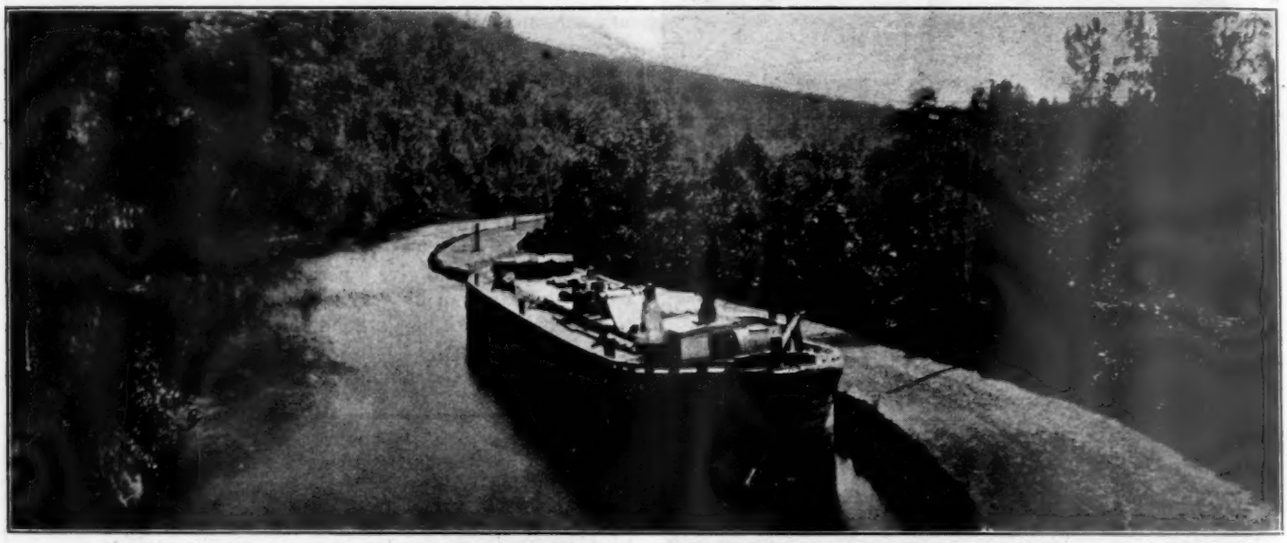
John B. Jervis, who succeeded Benjamin Wright, the planner and engineer of the canal. And it was Jervis' recommendations which led the company to send to England, in January, 1828, Horatio Allen, a young man of 26, to arrange for the building of four locomotives, and also to obtain iron for capping the wooden rails of the railroad. In terms of locomotives, the results of Allen's mission was the locomotive "America," designed and built by George Stephenson, the builder of the famous "Rocket," and three locomotives of a different type built by Foster Rostrick & Co. of Stourbridge.

"America," the first steam locomotive to be seen in the western hemisphere, arrived at the port of New York on January 15, 1829. The engine was taken to the yard of Abeel & Dunscomb, 365 Water street, where it was put together, supported on blocks so that the wheels ran free, and then demonstrated under steam from time to time during some three months, many visitors coming to see the wheels go round. Later in the season, the America, together with the first of the Foster Rostrick locomotives, was shipped by way of canal to Honesdale, and from that point all authentic trace of it has been lost until within the past few weeks.

The "Stourbridge Lion"

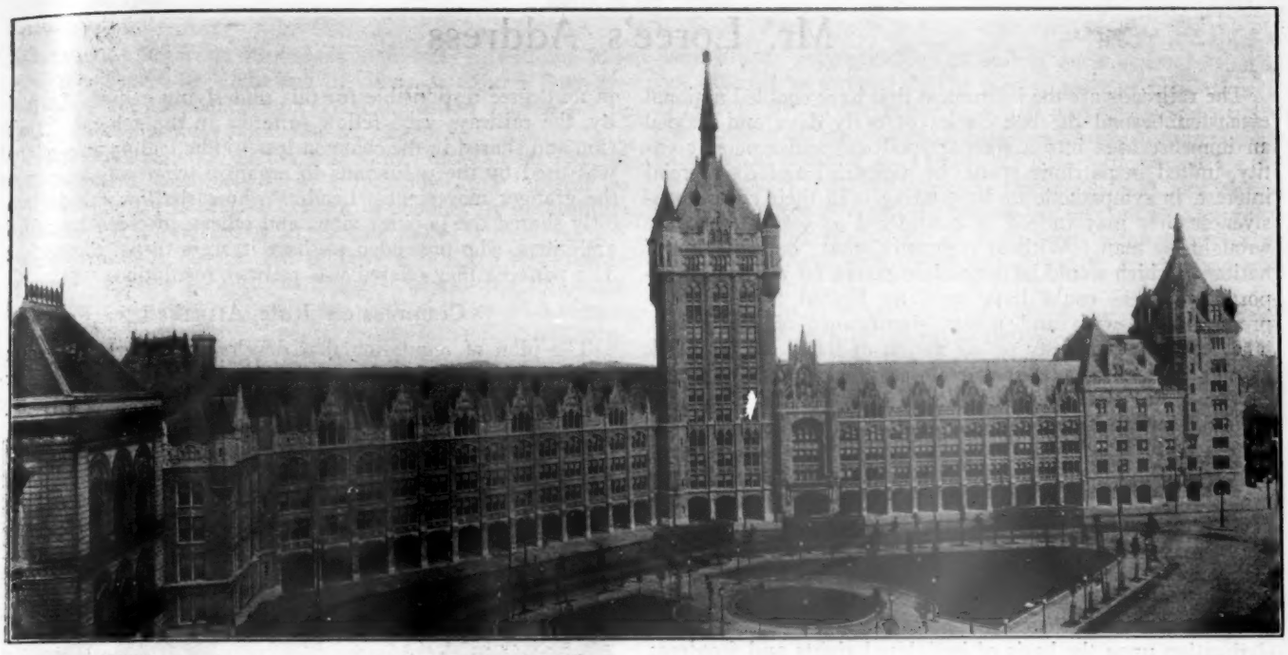
The second locomotive, which arrived on May 14, 1829, was the "Stourbridge Lion," the first steam locomotive to run on rails in America. Like the earlier arrival, the Lion was assembled and set up on blocks in the machinery works of William Kemble and demonstrated under steam, as the America had previously been. The two locomotives remained in New York until about the first of July, when they were sent by sloop up the Hudson to the eastern terminal of the canal, then called Eddyville, in recent years known as Rondout, where they arrived on July 4, reaching Honesdale a few days later. For some reason not now clear Horatio Allen, who had ordered the two engines in England and who was in charge of making the first test on the rails of the gravity railroad, selected the Stourbridge Lion, and early in the forenoon of August 8, 1829, the Stourbridge Lion was drawn up an inclined plane which had been laid from the side of the canal boat to the railroad track. A fire was built in the fire-box with Lackawanna coal and there was soon sufficient steam pressure for the trial. It had been the intention of Mr. Jervis that the locomotive should not put more than 1¼ tons of weight on each of the four wheels, but when the Lion's boiler was filled with water the engine was found to weigh over seven tons, two-thirds of which rested on the forward wheels, with the consequence that the weight on these two wheels was about double what Mr. Jervis had expected. Some critical observers on learning of this excess of weight predicted that the engine would break down the track on the curved sections of trestle work; while others, noting that the four wheels were rigidly set on the frame, declared that on curves the driving wheels would climb the outer rail and jump the track.

As these gloomy predictions seemed not unplausible, Mr. Allen declared he would take the entire risk of the trial upon his own neck, and he thereupon acted as engineer, driving the Lion two or three times back and forth over a section composed of straight track and a curve of 700 feet radius, crossing the Lackawanna creek on a trestle 30 feet high. The track didn't break down and the engine didn't climb the rails and jump off, but the result of the test as read afterwards in the condition of the wooden rails and the trestles was to convince the engineers that the structure would not withstand either the weight of the Lion or the side-thrust of the wheels on the curves. A little later the engineers considered whether it would be possible to rebuild the supported parts of the railroad and the curves in a more solid fashion to withstand the load, but for various reasons this was decided to be not practicable. The Lion was then taken off the tracks, set to one side, and for some 15 years was neglected, and, there is reason to think, partially dismembered, until many years later nearly all its parts were recovered in various places and assembled in the National Museum at Washington. The other two sister engines of the Lion were received in New York, but owing to the test of the Lion it appears that no attempt was made to use them.



A Coal Boat on the Canal

BUSINESS INTERESTS of British Columbia are endeavoring to secure passage by the Dominion Parliament of a measure reducing all freight rates through the province to the same basis as that used in the prairie provinces. Somewhat higher rates are charged in British Columbia because of the mountainous character of the country, which brings greater operating expenses and necessitated greater initial outlay than in the level prairie country. Some time since rates on farm products through the province were reduced to the same basis as in the prarie provinces in order to enable the farmers to ship their products bound for Europe westward via Vancouver and the Panama Canal. British Columbia business interests now seek a similar reduction for all commodities.



Headquarters of the Delaware & Hudson Company at Albany, N. Y.

Five Hundred Guests at D. & H. Centennial Dinner

Distinguished Men Attend Opening Celebration at New York—Loree Attacks Government Regulation

THE PROGRAM for the celebration of the centennial of the Delaware & Hudson Company included a dinner at the Hotel Astor, New York, on April 23, a trip by the president and a party of about 60 on a special train from New York to Wilkes-Barre, Scranton, Carbondale and Honesdale, and a luncheon at Scranton on April 24.

The guests at the dinner at New York, of whom there were more than 500, included men prominent in every walk of life. Space will not permit the reproduction of the entire list here but the mention of the following names will indicate the general character of the gathering: R. H. Aishton, J. S. Alexander, L. W. Baldwin, Bernard M. Baruch, August Belmont, W. G. Besler, W. G. Bierd, Major General R. L. Bullard, Nicholas Murray Butler, M. L. Byers, Newcomb Carlton, Senator R. S. Copeland, J. E. Dalrymple, Henry L. Doherty, Pierre S. du Pont, Newman Erb, Eugene G. Grace, Grant Hall, General J. G. Harbord, Charles Hayden, Otto H. Kahn, T. W. Lamont, E. E. Loomis, L. F. Loree, W. F. Morgan, W. T. Noonan, Major General J. F. O'Ryan, E. H. Outerbridge, E. J. Pearson, Samuel Rea, J. L. Replogle, Bird M. Robinson, Charles S. Sabin, Finley J. Shepard, A. H. Smith, James Speyer, E. T. Stotesbury, J. E. Taussig, F. D. Underwood, Samuel Untermyer, F. A. Vanderlip, Paul M. Warburg, Daniel Willard, W. H. Woodin, B. F. Yoakum.

Plans for the dinner were carefully worked out and the affair, while most elaborate, was staged perfectly. Before the speakers' table was a working model of the Stourbridge Lion, a D. & H. locomotive and the first to run on any railroad in this country. At either end of the table were other models of locomotives done by a pastry cook in sugar—one of them was the America, an early D. & H. locomotive, and the other a modern Mallet. There was a huge birthday cake lighted by a hundred candles on which an artistic pastry cook had pictured with colored sugar in bas relief the history of the company—old locomotives and canal boats down to modern trains, the whole monument, for such it was, surmounted by a miniature highway crossing sign showing a red light.

The Speakers

Eugenius H. Outerbridge, chairman of the Port of New York Authority, presided and L. F. Loree, president of the company, was toastmaster. Speakers were James S. Alexander, president of the National Bank of Commerce, New York, and H. W. Dickinson, honorary secretary of the Newcomen Society and assistant to the director of the Science Museum, South Kensington, London.

Mr. Alexander chose "Banking and Transportation" for his subject and dealt with the growth of these industries, their close interrelation and the dependence of the prosperity of the country upon their successful functioning. He made a plea for greater freedom of action for management and adequate earnings for the railroads as a means of restoring the confidence of the investing public in the railroads and, consequently, the assurance of adequate transportation development to meet the needs of industry.

Mr. Dickinson spoke on the use of steam power, tracing the development of the steam engine from its beginning up to the perfecting of the steam locomotive.

Mr. Loree as toastmaster gave a brief history of the early development of the company and then commented generally on government regulation and upon the prevailing political and industrial unrest in the country. The early history of the company is summarized elsewhere in this issue, so to avoid repetition, Mr. Loree's account of it at the centennial dinner will not be given; his other remarks, however, follow in full:

Mr. Loree's Address

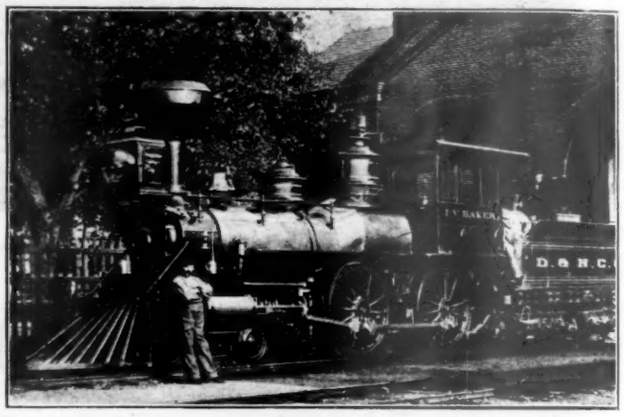
The railroads are the instrument that have enabled national extension beyond the boundaries of early days and welded an immense area into a compact political and economic entity, united in patriotic spirit, in industrial and commercial interest, in sympathetic understanding. In their comprehensiveness they may indeed be considered as works of nature wrought by man. Without commerce, that "calm health of nations," which would be impossible except for railway transportation, there could have been no United States in the present world-wide and potent significance of that name. The power and majesty of the nation of today are founded, as may be seen by all, upon railroad efficiency, as efficiency developed out of the potentialities of economic incentives, individual initiative and freedom of contract. Without these factors there could have been no American railroad system, as it is known to us, and without such a system the American people and nation, as they are known to the world, could never have come into existence.

We may divide this century of surpassing progress into two parts of almost equal duration. The first is the period of the pioneer, of indomitable courage and rude adventure, of the strong will to overcome obstacles and to create a new civilization upon the basis of individual rights and freedom; a period of bold exploration, courageous experimentation and of sturdy growth. The second half is no less a period of achievement and growth, but it has been more the achievement wrought by the relatively few and the inevitable response to the vast potentialities of recognized but latent resources. It has become, increasingly and unfortunately, a period of doubt; of somewhat popular denial of political and economic principles that were once commonly deemed established, the grounds for which, no less immutable than before, seem to have passed from the recollection of great masses of the people. It has perhaps become, in some quarters, a period of weariness from the rapid pace of progress, of refusal to regard its benefits as the equivalent of the effort necessary for its maintenance, of envy and distrust of those agencies that have most efficiently contributed to national wealth, security and the diffusion of human comfort. These respective phases of national existence find record in the archives of this corporation as well as upon the statute books of the state and the union.

It is characteristic of new countries that their industrial growth is rhythmic rather than regular; there are wave-like periods of intense activity and rapid progress, followed by similar periods of depression, the crest of each period of progress rising higher than that which went before. An extraordinary period of activity, in this country, followed the civil war. Government artificially stimulated this by carrying out what was in reality (although not understood as such at the time) a gigantic land-jobbing scheme for the settlement of the trans-Mississippi region. To this end railroads were aided by land-grants, tax immunities and other concessions, land was given to settlers, immigration (both interstate and foreign) was encouraged. In 1873, and again in 1884, serious losses were realized; agrarian discontent was widespread throughout the newly-settled areas; those who suffered looked, without the keenest of vision, for a reason and thought they found it in railway practices, this conclusion being more easily reached because the railways were mainly owned in the East and in Europe. Of course, dealing with so large and complex an industry, there was no difficulty in supplying a bill of particulars, but this was merely the list of grievances, some real and more imaginary, that could be made up at any time and in respect of any large section of the economic order. It is important to note, however, that the basis of unrest was much more fundamental than any abuse of railway administration and that the railways were in no degree responsible for this underlying cause. In reality, the railways were fellow sufferers in the general depression and shared in the common loss. The feeling engendered was used by the politicians to organize what was known as the granger movement. Leaders whose shallow minds honestly shared the popular view, and others, inspired by selfish ambitions, who pretended to share it, were thrust to the fore. The panacea they offered was railway regulation.

Commission Rule Attacked

The plan of regulation that developed the greatest popularity involved the creation of commissions, the essential characteristic of which is that although their members are usually



The "I. V. Baker"

appointed in the same manner as the subordinate members of the executive branch of their governments, they really exercise the powers of a legislature. The distinctions among the three classes of governmental power are that (1) the legislature establishes the rules of conduct, (2) the judiciary interprets and applies these rules, (3) the executive enforces them. But these commissions make rules of conduct for the future which are distinguishable from those made by a legislature only by the fact that the former are special rules applicable only to the conduct of the parties to a proceeding before the commission while true legislation must always fix rules of general application. Thus those subject to such commission rule are no longer controlled by general rules of conduct applicable to all similarly situated, but, in case after case, these commissions set up special rules of conduct controlling only the parties to the particular proceeding and no more, therefore, than the rule of the case. Unlike judicial determinations, these commission proceedings are not the interpretation and application to the special facts of a controversy of a preexisting rule of conduct.

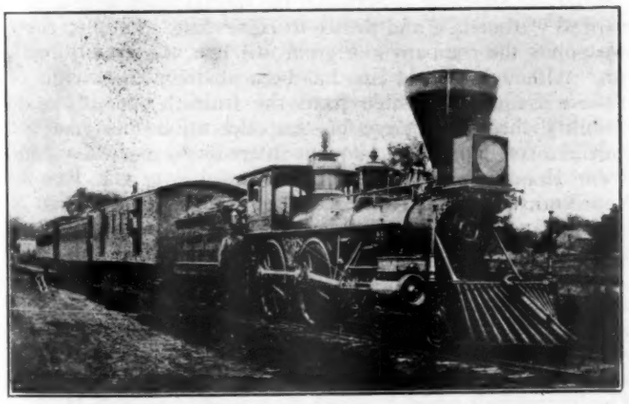
This system of control, so repugnant to the genius of American political ideals and institutions, gradually developing for the past 50 years, has eaten like a cancer into the stability of the railway industry, and at this moment seriously threatens its economic efficiency and the general welfare of the American people. It is no longer confined to the railway industry but now affects every undertaking in the so-called "public utility" field; those in which the capital used is held, in law, to be "charged with a public interest." In recent periods of prosperity, when all other American industries have been active and successful, drastic laws have held these "regulated" industries to a dead level of low earnings and inability to provide normally for meeting increased demands for service. The "rake's progress" of regulation which has produced these serious consequences and threatens others still

more serious, began as most similar episodes in national history have begun, by slight and insidious departures from the principles of government that have approved themselves to liberty-loving peoples since Magna Charta.

The fundamental achievement of those who wrung that immortal document from a reluctant king aspiring to personal control is that all control of conduct by government shall be by general rules applicable to all alike. Such a government is a government of laws and not a government of men. It was the ideal of Samuel Adams and Benjamin Franklin and George Washington and of those who formulated and approved the Federal constitution. It was supposed to have been firmly intrenched in the bills of rights of all American constitutions from 1776 onward. But, after 1873, the states began to set up commissions with authority, at first slight and closely restricted, to make rules of conduct no longer general but applicable only to particular cases. These bodies do not interpret or apply law, they are sham legislatures, and make whatever special laws their members consider desirable to meet the exigencies of particular situations. These special rules of conduct, applicable to the parties summoned and to no others, are the consummation of inter-parte proceedings begun by complaint or by an initiative in the nature of a complaint. Parties are heard as though in court, and a decree entered, but this decree controls the future rights of the parties, not as an adjudication determining rights under pre-existing law, but as a legislative declaration of what shall be permitted in the future.

Degeneracy of the System Inevitable

The degeneracy of such a system is inevitable. It sets up a buyers' tribunal, controlled by no standards of law or equity, certain to become the advocate of those selfishly interested in depressing rates. With such a tribunal, the statutory basis of its existence tends to become more drastic, powers tend towards augmentation, fair and reasonable members tend to be replaced by partisans, who are not ashamed to be the mere mouthpieces and agents of those who make



A Passenger Train of Civil War Days

use of the regulated service. Political pressure, strengthened and supported by short-sighted notions of self-interest, always and invariably promotes these results.

All such regulation is inevitably ineffective to satisfy the hopes and prejudices of those by whom it is sustained. It cannot succeed, in this sense, because these prejudices and the hopes and the motivation of short-sighted self-interest, when not subject to the check of responsibility for financial results, are without limit. In consequence, every successive addition to the regulatory power results in renewed disappointment and this disappointment, exploited by the official body, is easily translated into pressure for still further power. In this way, the failures of regulation become, instead of recognized evidences of error leading to repeal, steps towards more drastic regulation. The end of such a progression is not difficult to foresee; in the case of railway regulation, it is plainly within the range of vision and takes the form of the disaster of government ownership and operation. This calamity, if it comes, will be the price paid for the incapacity of leadership that is apparently unable to find any escape from the grotesque and monstrous futility of adding every year to the superstructure of regulation, although its very foundations have been tested and shown to be unsound and unsafe.

Moderation in the terms of regulation does not necessarily imply higher rates or returns to investors. Either might well be demanded at this time but they ought not to be confused. It is not certain that a mitigation of the rigors of regulation would result in enhanced rates or earnings; the only certain result of such mitigation would be a commensurate restoration of freedom to the industry. Managements would regain initiative and hope; anticipation of the confiscation of achieved economies would disappear; confidence that reward would follow successful endeavor would be renewed. Investors would be less exacting in respect to immediate returns if relieved of the limitations, actual or threatened, which undermine or destroy confidence in the future.

To what condition then have we been brought? On the twenty-second of November, 1920, I was a witness before the Interstate Commerce Commission in the New England rate case. I called the attention of the commission to the fact that the index figures of 15 representative railroad stocks was given by the press at the culmination of the market advance in November 3, 1919, at $119.62, and that it then stood 40 per cent lower; that the corresponding index figure for 15 representative industrial stocks had similarly declined from $112.44 by 40 per cent. At the present time the decline in the index figure stands in the railroad list at about 46 per cent, a position even lower than two and one-half years ago, while in the industrial list it is no more than 12 per cent.

That is, to express it in another way, the confidence of the investing public in industrial organizations is unimpaired, their values reflecting the general condition of business; railroad values are unresponsive to the general conditions of business; the investing public has lost all confidence in them.

Railroading is no longer a business, it has become a calamity.

But it is not alone the railroads that are being destroyed; the very vitals are being torn from the body of our liberties, while the temptation held out to the producer to loot the savings of those who have invested in railroads is destroying the foundations of justice and morals upon which alone an orderly government can be maintained.

Has Russia no meaning for us? Must we also suffer the nightmare of Utopian intoxication?

Has Italy no meaning for us? There a people energetically struggle to prevent the destruction of civilization, resolved that mankind shall not have again to begin the weary round of development, already in the last 5,000 years seven times undertaken, even if in avoidance of catastrophe they the forced to employ extra-legal methods.

For us, in the providence of God, the middle of the road still lies open.

Let us take heart from the adventures of our forefathers. Let us be guided by their experience and aspirations, not because they are ancient but because they are ever young. Retracing our steps from the morass into which we have wandered, let us return to the solid land, not because we wish to look back, but because we are determined to go forward. Guided by their example, let us set out anew upon the course they so long pursued with such enormous advantage to themselves and to us, their descendants, that we may hand on to our successors a heritage at least as rich as the one we received.

Special Train Party at Marvine Breaker, Near Scranton

Second Day of the D. & H. Centennial Jubilee

Tour of Anthracite Region and Route of Gravity Railroad —Luncheon at Scranton

A TOUR of inspection by the president and a party of his officers and guests on a special train through the anthracite region with a luncheon at Scranton at noon, attended by some 300 persons, marked the second day of the Delaware & Hudson centennial celebration.

The special train left New York shortly after the dinner which was held on the evening of April 23. It was routed over the Lehigh Valley to Wilkes-Barre where it went onto the D. & H. rails. About five miles north of Wilkes-Barre at the Hudson Coal Company's Laflin breaker a stop was made for breakfast which was served in four dining cars that were drawn up on an adjacent track. After breakfast the party was taken on a tour of inspection of the breaker. The next move was to the Marvine breaker, two miles north of Scranton, which is one of the most modern to be found anywhere. The party was then taken in automobiles to the Hotel Casey at Scranton where luncheon was served, not only to the train party but to prominent citizens of the community, a number of railway officers and several veteran employees.

At the Laflin Breaker—General Manager J. T. Loree (with Cane) in Foreground

After the luncheon at Scranton the special train went northward to Carbondale and thence to Honesdale. Between these two points the company's original rail line, the gravity road, ran. Although the old line has been abandoned, remains of it were frequently visible from the train. To add to its visibility those in charge of the celebration had had the embankment marked at frequent intervals by white banners. From Honesdale the special was routed over the Erie to New York which was reached at 8:30 p. m. For a portion of this distance the Erie follows the Delaware & Hudson's abandoned canal.

Arrangements for the trip of the special train were well made in advance. The route of the party through the coal breakers was chained off and arrows pointing directions were painted on the floor. Placards were fixed to machinery telling its uses and experienced coal men served as guides. The locomotives which handled the train on the D. & H. were freshly painted and carefully cleaned.

At the Scranton luncheon, Charles S. Weston, a member of the board of managers of the company, presided, introducing President L. F. Loree as toastmaster. Speakers were W. H. Williams, vice-president of the company, and H. W. Dickinson, honorary secretary of the Newcomen Society and assistant to the director of the Science Museum, South Kensington, London.

Mr. Dickinson's address was in the nature of a complement to his New York address in which he sketched the history of the steam engine. At Scranton he gave fewer details concerning the steam engine and emphasized the history of the locomotive from the time of Trevithick. He also summarized the history of the development of the canal, giving some examples of early canals and the various means used to overcome distances in level. He included some informa-

tion about the development of the rail, telling how weak rails for a number of years retarded the development of the locomotive.

Mr. Loree's address as toastmaster dealt with labor relations and Mr. Williams' address was entitled "Anthracite Development and Railway Progress." They follow in part:

Mr. Loree's Address at Scranton

We are met with various considerations of capital and labor. To limit the discussion to these two, to ignore the part played by management, is as though one were to discuss mankind in terms of body and mind, giving no significance to the soul.

It is difficult to make out from the current literature any reasoned attitude toward the three elements involved. We need an assembling of all the facts and systematic reasoning upon them. Strong effort should be made for clarity. Words are confusing things. With clear definitions, doubtless half the arguments in this world would be avoided. We are also but little disposed to govern our conduct by the experience and counsels of those who have gone before, many far wiser than we. We see the purpose of some to reverse the philosophy of the parable of the wise and foolish virgins; they

Train Party at the Marvine Breaker—H. W. Dickinson Second from Right

propose that the wise should equally divide with the foolish, if indeed the wise are not to be altogether stripped of their holdings on the score of selfishness; the aim being that having freed the slave, we shall now reduce to involuntary servitude both capital and management. We may be sure these aspirations, if indulged in, will not be worked out successfully.

But the earnest searcher of current literature makes out that three things are put forward as of immediate importance:

1. Continuity of employment,
2. Human relations,
3. An equitable distribution of the joint product.

1. To a degree known in few other occupations work in a service such as ours is continuous. When our insurance plan was put into effect we made a painstaking inquiry into our experience. Of 13,111 men, 10,554, or 80 per cent, had been in the service more than two years. Of the whole force only 178 had been in service less than six months. And this notwithstanding the dislocation caused by the war. There are now 100 men on the payrolls whose minimum term of service is just under 50 years, the oldest in service being John Van Went, who began in 1866, at the age of eight, not especially harmed, apparently, by child labor. In this service, seasonal idleness is minimized and the labor turnover in times of extraordinary business activity is confined largely to a few places and marks merely the continual coming and going of a few restless, discontented, unfitted men; the effort to employ the unemployable. I believe the arrangement now in effect with the shopcrafts, not to decrease the force in dull times until all are on an 8-hour basis or to increase the number employed in flush times until all are on a 10-hour basis, will be most helpful and doubtless other expedients will be found, the more so if the men lend themselves heartily to a reasonable accommodation.

2. It goes without saying that every employer should govern his conduct by sympathetic and practical recognition of human character and aspirations of the employee as a human being. Discipline we must have. Certain principles and rules must be laid down and extended by oversight and control. To be effective they must be prompt, reasonable, impartial, severe enough to be felt and to be of lasting benefit. And this calls upon the officers for a civil hearing, quiet, dignified and manly; the exercise of good temper, patience and common sense; respectful attention to all communications made in good faith. With induction into the service, systematic instruction in duties should begin, and the employee should be well-prepared to turn a deaf ear to the imposing sophisms, alluring expressions and intense fervor of men who handle ideas without ever coming into contact with realities. And there are, of course, numberless ways in which the men may be helped whether by individual assistance and counsel or by organized provision.

For a number of years the Delaware & Hudson Company has been developing, and last year it put into effect, a system for providing its permanent employees with a considerable measure of protection against the major hazards of life, these being unemployment, sickness, accident, superannuation and death.

3. Distribution of product. There remain, indeed, many points in the employment relation which need remedial action and constitute problems of varying importance, not only to this company but to all employers. Perhaps most prominent of these, at least in the way of pure theory, is the question of the employee's sharing in the profits of the capital with which the management conducts the business. Both analysis and experience have destroyed the once more or less popular Marxian fallacy of surplus labor value; and the fact seems to be that no one has succeeded in determining, with any credible definiteness, what contribution this or that employee makes either to the value of the product or to the final profits —or losses. This general problem, so universally shirked by economists, is well worthy of study and research, but in regard to such further investigation we must keep in mind as a guide, that the continuance and prosperity of the enterprise itself is the first essential; not even fair wages, to say nothing of shared profits, can be paid by an unprosperous industry.

The human body is a heat machine, and its emanation of force is very feeble. So small is the energy output of man that he has only been able to rise from a state of nature only by providing himself with tools, and of far greater significance, with other sources of power. In the many branches of the company's activities we employ 35,371 men and 969,626 horse power—water power, steam used directly, and steam transmitted electrically together with the artful assistance of the mechanical motions, the lever, the screw and the wedge, multiple gears, high speed steel and all the resources of modern invention and development. Sir Hugh Bell estimates "that 75 per cent of the total value of the commodities produced goes to pay the persons engaged in producing them," and this would appear to be far more than their contributive share, if measured against the joint production. The fact is that the employment relation is a mutual relation, entered upon without compulsion and only upon terms agreeable to the several parties in interest, and it is this that happily

works, under the much berated relation of supply to demand, steadily to increase the reward of the laborer. The rewards of capital are usually much overstated, and the distinction is seldom drawn between income and spendable income.

The lesson of all industrial experience today is that the prosperous industry rests inevitably upon practical working co-operation between management and employees, and an adequate supply of capital.

The one hopeful way to profits for all is by increasing production. Any attempt to grasp the fruits of progress before the tree that might produce them has been cultivated, can only result in disappointment and failure.

If the rewards of the future are to be increased, the most important task, incumbent upon employers and employees alike, is to increase the product of enterprise.

We celebrate the one hundredth anniversary of a business enterprise that has been the support of thousands of employees, that has through fair and foul weather returned a modest income to those of thrift who have supplied capital, and that has been the fruitful field for the highest application of managerial effort. What then of the coming century?

If we are to work intelligently, we can work for but one object—the safety and development of our industry. It is from that spring that bounties flow.

Anthracite Development and Railway Progress

By William Henry Williams

Coal was to the Delaware & Hudson Company, and its railway, as cause to effect. It was that, also, to that earliest locomotive of which we boast, and to the steam engine, in which every locomotive had its genesis. The first uses of the inventions of Newcomen and Watt were in pumping English coal mines. And *railed* roads were known to the mining practice of Newcastle-on-Tyne for 200 years before the first common carrier *railroad* came into being with the opening of the Stockton & Darlington on September 27, 1825. Regular use of locomotives in English colliery practice antedated the Rainhill competition by not less than 17 years. Precisely as the railway, the steam engine and the locomotive were developed as incidents of English colliery practice, just so the Delaware & Hudson's railway system was evolved to enable the mining and marketing of the "black stones" or "stone coal" or "anthracite" of this region. It is a romantic and fascinating story.

Men knew something of the fuel content of northeastern Pennsylvania long before the wisest suspected its value. The American Indians appear to have known that it would burn and occasionally to have resorted to its use as early as the year 1710, but there is no record of similar knowledge on the part of any white man until 52 years later. Discoveries of coal at different dates seem to have been made in the Wyoming, Lehigh and Schuylkill regions. The first recorded is that of Parshall Terry and a group of Connecticut settlers in the Wyoming Valley, who found anthracite on the banks of the Susquehanna river near the site of Wilkes-Barre. Four years later, James Tilghman, of Philadelphia, reported finding what is probably the same bed of coal and a small sample was sent to William Penn, then in London, with the modestly prophetic remark that—

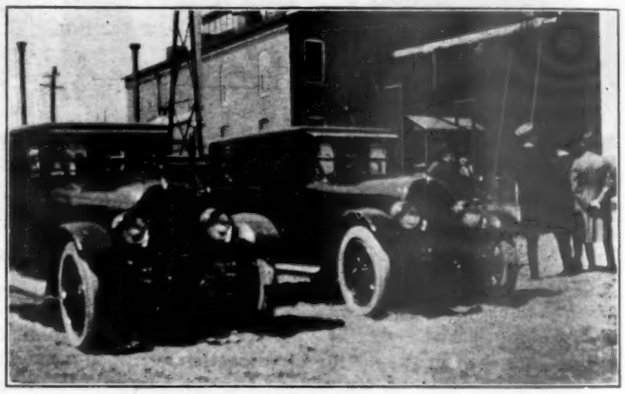
> "This bed of coal, situated as it is on the side of the river, may some day or other be a thing of great value."

The existence of anthracite at Carbondale became known in 1799. These discoveries received little attention and few among those to whom they became known suspected their significance. The region was remote, rugged, inaccessible and wild. Roads were few and so poor, where they existed at all, that they would now be regarded as impassable. Its rivers were torrential and were not navigable except after costly improvements.

Moreover, it was doubted whether anthracite could successfully be burned for any fuel use. It actually had been used at the government arsenal at Carlisle, in aid of the manufacture of arms for Revolutionary soldiers, for in 1776, two Durham boats which had been sent to Wyoming were loaded with coal at Mill Creek, a few miles below the mouth of the Lackawanna river, and floated down the Susquehanna to Harrisburg, where the coal was unloaded and conveyed in wagons to the arsenal. This is the first recorded shipment and the first known industrial use. It made little impression for in 1800 William Morris was unable to sell a wagonload which he had taken to Philadelphia.

In 1808 Judge Jesse Fell, who "kept tavern" in Wilkes-Barre, and was in other respects a man of standing and enterprise, burned anthracite successfully in a grate. He wrote that he had succeeded in burning "the common stone coal of the valley" in a grate, in a common fireplace, and had found that it would serve as fuel, making a cleaner and better fire at less cost than wood.

In 1812, Colonel Shoemaker, of Pottsville, hauled nine



A Fleet of Automobiles Was Provided to Transport Party from Marvine Breaker to Scranton

wagonloads of anthracite to Philadelphia, and could sell only two, giving the balance away. He narrowly escaped arrest, on the charge of attempting to sell for fuel something entirely worthless. His enterprise cost at the rate of about $28 a ton, but was an important step in obtaining recognition of the fuel value of anthracite, principally because a wagonload was sold to White & Hazard, who operated a wire-works at the Falls of the Schuylkill. A whole night was consumed in efforts to make the coal burn and, in final despair, the workmen abandoned the endeavor but chanced to leave the door of the furnace shut. Fortunately, one workman forgot his jacket and, returning to recover it, found an excellent fire and the furnace red-hot.

During this year, the war of 1812, interrupting trade between Virginia and Liverpool, cut off the normal supply of charcoal and brought about very high prices so that men who knew the properties of anthracite undertook to push its use as a substitute. It was probably under this stimulus that Williams Wurts, whose enterprise led ultimately to the organization of the Delaware & Hudson Company, then a progressive merchant of Philadelphia, began to acquire coal lands. He was attracted to the Carbondale region and finally

obtained a large acreage. William and his brother Maurice Wurts opened mines and sent their first arkload to Philadelphia in 1815. This shipment was hauled to the Lackawaxen river in wagons, at a cost of $2.50 per ton, and there loaded in arks in which it was floated to the Delaware river and onward to Philadelphia.

Turning to New York

Between 1812 and 1822, the Wurts brothers acquired coal lands sufficient for their purposes but their efforts to market this product in Philadelphia met with nothing but failure and disappointment. Their last attempt to sell in that market was during the later year. Abandoning it, then, to their competitors in the nearer Lehigh region, they turned to New York, a potential market in which anthracite was as yet totally unknown. By 1820 the region now known as Greater

Special Train at Honesdale—Daniel Willard and F. D. Underwood Among Those in Foreground

New York had a population of 152,056, more than twice that of Philadelphia, but there were no direct routes of communication with the anthracite fields and no local demand for anthracite existed. In order to sell coal in this metropolitan market, it was necessary again to demonstrate its utility and to create practicable means of transportation. Attention was immediately given to both necessities.

By 1822 plans had matured for a transportation system to consist of a gravity railroad, a series of inclined planes operated by rope haulage, and a connecting canal to the Hudson river. Early in 1823 Pennsylvania conferred authority to improve the navigation of the Lackawaxen and Delaware rivers and one hundred years ago, New York granted its legislative charter to the Delaware & Hudson Company, which it endowed with power to construct a canal connecting the waters of the Delaware and Hudson rivers. In 1824 Pennsylvania authorized the New York corporation to purchase the interests of Maurice Wurts.

The first load of canal borne coal reached New York City on December 10, 1828, but four years earlier, in anticipatory efforts to create a market, the company had contrived to have a boatload delivered in that city. The problem of marketing was always imminent in the eyes of these, our predecessors, and from it there never has been and never will be any escape.

On May 20, 1829, the board of managers authorized the president to have cooking apparatus installed in the banking house, in order to show that the company's coal could be burned therein. During the next year they investigated the Boston market; sent samples to Providence and even shipped several hogsheads containing anthracite to New Orleans. In 1831 it was arranged to furnish the Ulster Iron Company with coal for experimentation in steam production and the steamboat "Experiment" with enough coal for a trip to Newburgh and return. During the same year coal was supplied for the steamboat "Victory" and for the use of the Walnut street ferry boat; and employment was given to Nathan Smith "to introduce the use of coal in manufactories and all establishments using steam engines," and to R. Spencer "for introducing the use of coal to blacksmiths, etc."

Efforts to extend the use by boats continued and, in 1836, anthracite was first used for a round trip to Albany. On June 23 of that year, the "Novelty," with the managers of this company and distinguished guests, left her wharf at six in the morning and arrived at Albany twelve hours later, the first steamboat propelled by anthracite to achieve that voyage. In 1848 experiments were made in use of anthracite in the manufacture of salt at Syracuse and Salina, and upon the results of these experiments an expenditure of $10,000 to promote the adoption of this fuel was authorized. In 1868 the company began forwarding coal down the Susquehanna to Baltimore, along the lines of road connecting Wilkes-Barre with Jersey City, and it was noted that during the following year they anticipated entering "the great and rapidly developing market of the west."

Preparation of Coal for the Market

With developing markets there came great changes in preparation for market. The earliest uses were principally, if not wholly, in iron works and in steam production. Large chunks were best adapted to these purposes and the output was then designated as "lump" coal. Later, there came to be a separation into two sizes, named in accordance with their chief uses: "steamer lump" and "furnace lump." For domestic use a smaller size was demanded. It became necessary, therefore, to break some of the larger sizes and to develop a size known as "grate" or "broken." Later, with improvements in appliances for domestic heating and cooking, there came to be a market for still smaller sizes, known as "egg" and "stove." These constituted for many years practically the only marketable sizes, and to save the cost of bringing to the surface a great weight of the smaller and unmerchantable sizes, each miner was provided with a rake, the prongs of which were two to three inches apart, and told to leave in the "gob" all the coal which would pass through these prongs. Such rakes were in use until about the year 1880.

Moreover, the material taken to the surface became, to a considerable extent, crushed during preparation and sizing, producing more unmarketably small coal which had to be treated as refuse and dumped, with rock and slate, in the culm banks. It was not through carelessness or willingness to waste any marketable coal that these small sizes accumulated in the mines and in the old culm banks, but the disposition made of them was one of the necessities of the day.

From time to time, progress in the use of anthracite has brought, one by one, the smaller sizes into use. Even coal dust can now be used in sintering plants and in briquetting; and it may not be long before there is a market for every particle of combustible material that can be mined. The first market, that for furnace lump, which was used mainly in blast furnaces for making pig iron, has been completely supplanted by the use of coke, a cheaper product, and although anthracite *could* still be used in making pig iron, that market has permanently disappeared.

The problems of marketing are not ended. As the oldest are surmounted, others arise, and some are perennial. Although anthracite is now sold from New Brunswick, in Canada, to the Potomac river, and westward to Duluth, St. Paul and Denver, it enjoys no monopoly in any market. Its relative freedom from dust and dirt and its smokeless character give it an advantage over bituminous coal, in all domestic uses and in cities where smoke is objectionable, but, save in those communities in which the use of smoke-producing fuels

is forbidden by effective public authority, this advantage would not overcome a materially greater difference in price than that necessarily resulting from present mining conditions.

Development of Mechanical Appliances

Progress in mining practice and in the preparation of anthracite for market would in themselves furnish material for an extended address. The elimination of impurities was for years accomplished by hand picking; later, automatic, mechanical appliances were devised, and these are still in process of improvement. All such devices depend upon the difference between the specific gravity of slate and coal. Hand picking was first supplemented by inclined chutes with gaps over which coal would jump, but through which slate would drop owing to its inferior momentum. While these methods were used, the coal was usually handled in a dry state, resulting in a great deal of dust. The next important step in automatic cleaning was the adoption of the "jig" by which coal, sprinkled, and made wet on entering the breaker, thus settling the dust, is agitated while immersed in water and the slate sinks to the bottom while the coal is recovered at the top. Other inventions are claimed to advance the art of separation. These immerse the material to be separated in mixtures of sand and water, kept at such a consistency that the line of separation between slate and coal becomes very sharply defined. Experiments have not reached a point at which it is possible finally to determine whether they can be substituted for the jigs, but great hopes are entertained.

The Labor Problem

The problems of mining are administrative and mechanical. Fifty years ago the racial elements represented in the mines were English, Scotch, Welsh and Irish. A few Welsh and Irish remain, but for many years recruiting has been from the southern or southeastern races of Europe and now not less than 34 dialects are recognized among the mine workers.

Relations between employees and employers have been fixed by processes in which negotiation and agreement have been intermixed with superimposed authority, so that it is difficult to define the limits of either. The great constructive work of the Anthracite Coal Strike Commission, appointed by President Roosevelt, in 1902, continues to be the ground work of these relations, but there have been great advances in wages and material reductions in the hours of labor. And there is now practical recognition of the union known as the United Mine Workers of America which was in specific terms declared by that commission to be undesirable. A short strike in 1912, and the strike of last year, which was only one day shorter than the strike of 1902, have been the only general interruptions to the orderly conduct of the industry since the award of twenty years ago. Local strikes, principally "button" strikes, which are for the purpose of forcing every mine worker to belong to the union and to pay dues to its treasury, are of frequent occurrence in the experience of every operator, although they are in flagrant violation of the agreement, in contractual form, to which the Mine Workers' Union is a party.

Collective bargaining, and contractual relations resulting from such bargaining, can never be fully effective, in the sight of either party, until both recognize such contracts as having the exact status of other contracts relating to business and their legal and moral obligations are fully respected on all sides. Consumers who have adjusted themselves to a regular supply of anthracite, and whose comfort is measurably dependent upon the continuance of such supply, cannot have that full protection which they are entitled to ask, until great combinations of labor are charged with the same public responsibility and obligations which attach to other combinations in trade and industry.

Although the literature of mine-engineering is extensive, there is nothing in print in this country, and very little in England, which could enlighten the miner as to the methods by which he could attain maximum earnings by increasing the efficiency of his work at the face. Practical inquiry resulted in assigning instructors, in the actual work of mining, to the ten or twelve employees in each operation whose earnings were least. This effort has been continued long enough to show that by instruction thus given, the average earnings of a group of miners thus selected, can be increased $1 to $1.25 per day. This instruction covers the proper placement of the hole, the angle, depth and size to be drilled, the character and quantity of explosives to be used, the method of tamping, etc.

Interesting Facts About Anthracite Mining

Progress in mechanical methods has reached the point at which, by means of undercutting machines and electrically operated scraper lines, coal can be taken from veins of 24 to

Alighting from Special Train Near Scranton

28 inches thick, without the removal of either the top or bottom rock. This, and the application of scientific methods to second mining, is resulting in a conservation of this great natural resource which would have seemed utterly impracticable twenty years ago.

Some of the mechanical measurements are startling.

This company elevates to the surface fourteen tons of water for each ton of coal that is prepared and sent to market from its mines. The mine tracks, under ground, in its collieries have a combined length of 650 miles, or more than two-thirds the length of the great railway system that has been developed as an incident to the marketing of the coal. Each miner is a shipper, who must have several mine cars delivered one at a time during the day, and 20,000 of these cars have been loaded and unloaded in one working day.

Anthracite is recovered from ten to twelve superimposed beds at a single operation, each bed extending over an area of from eight to ten square miles, making a total of from 80 to 120 square miles for one colliery operation. Owing to the greater depth of anthracite mines and the complicated and costly apparatus required in the preparation of hard coal, the present cost of a new operation, capable of an annual output of one million tons, is about $8,500,000, for the anthracite region; while in the bituminous fields the average cost of a plant capable of similar output would be approximately $2,500,000.

THE TELEGRAPHERS' NATIONAL BANK of St. Louis, a co-operative institution with a capital of $500,000 and a surplus of $100,000, owned by the Order of Railroad Telegraphers, will be opened for business on June 9, according to present plans.

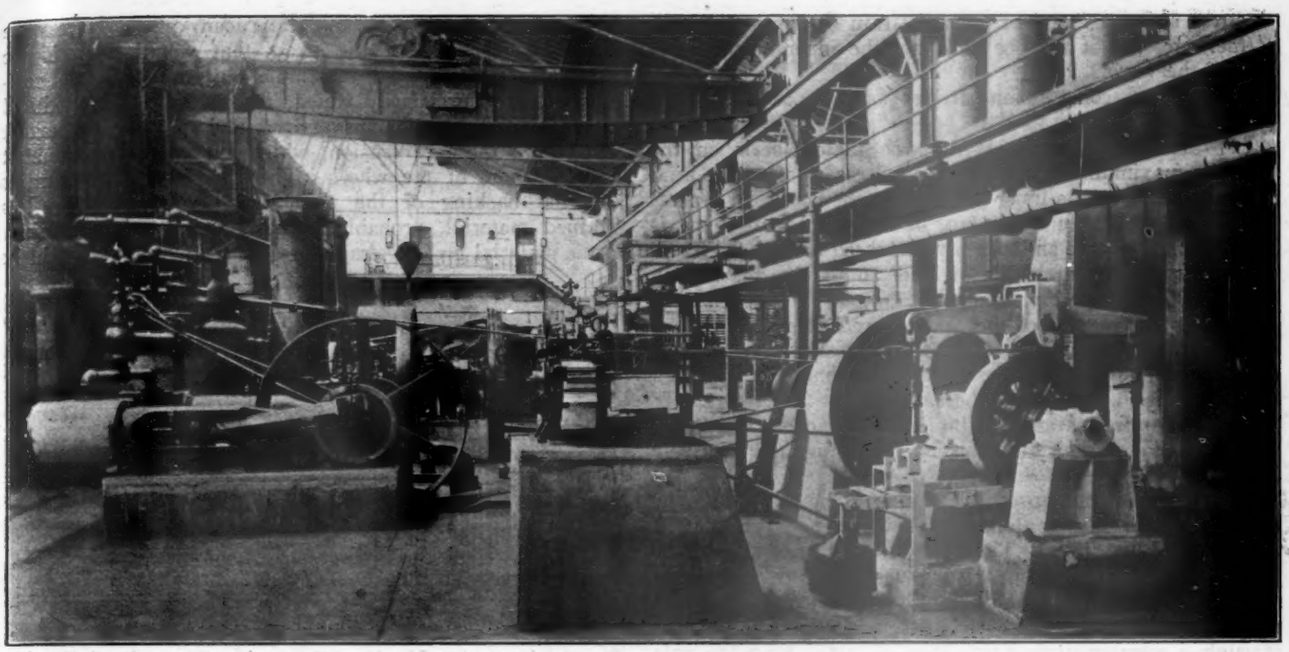


Fig. 1.—Laboratory with Brake Shoe Testing Machine and Dynanometer in the Foreground

Properties of Chilled Iron Car Wheels

Stresses Due to Mounting Static Load, Flange Pressure and Brake Applications

AN investigation covering some of the properties of chilled-iron car wheels has been conducted at the University of Illinois, the work having been carried out under the direction of J. M. Snodgrass, professor of railway mechanical engineering, and F. H. Guldner, special investigator, and with the co-operation of the Association of Manufacturers of Chilled Car Wheels.

The results of that portion of the investigation dealing with the stresses caused by forcing the wheel upon its axle and thereafter applying a static load were covered by Bulletin No. 129 of the Engineering Experimental Station. Additional data on the same subject together with the results of the investigation on flange pressure stresses, the ultimate strength of the flange and the possibility of increasing the flange strength by adding metal were given in Bulletin No. 134. The stresses due to brake applications, also data relative to the coefficient of friction and brake wear were given in Bulletin No. 135. An abstract of these bulletins follows:

A car wheel in service is subjected to stresses caused by (1) manufacturing processes, which may cause initial stresses; (2) forcing the wheel on the axle, or mounting; (3) the proportion of the car loading supported by one wheel; (4) the lateral pressure on the wheel flanges produced by rounding curves, by wind, or by the unevenness of the track; (5) nonuniform temperatures in the wheel caused by brake application; (6) centrifugal force when the speed is high.

Important initial stresses, if existent, can be traced to improper manufacture. Annealing is universally practiced and if properly performed, either removes or reduces to a small amount the inevitable initial stresses.

Stresses Caused by Mounting Wheel on Axle

The strains in the wheel caused by forcing it on the axle were first determined for two 33-in. 725-lb. M.C.B. wheels. The same pair of mounted wheels was then subjected to static loads ranging from 20,000 lb. to 200,000 lb. per wheel and the resulting strains noted. The loading effect was produced by applying the load to the axle by means of a testing machine and allowing the wheels to transmit it to a pair of rails, the conditions being similar to those found in service. A similar set of tests was carried out with a pair of 33-in. 740-lb. arch plate type wheels.

Forcing the wheel on the axle produces compression in a radial direction and tension in a tangential direction throughout the entire wheel. The intensity is greatest at the bore and decreases toward the tread, being negligible at the rim. On being placed in service, the wheel encounters conditions that produce an exceedingly complex stress distribution within it. Only those due to static load are considered in the initial report.

The results of this portion of the investigation may be summarized as follows:

(1) The tensile strength of the metal taken from different parts of the plates ranged from 23,300 lb. to 32,800 lb. per sq. in. and the modulus of elasticity ranged from 14,000,000 lb. to 28,000,000 lb. per sq. in. It is probable that these variations may be explained by variations in chemical composition of the several specimens and variations in the treatment of the wheels after casting. Whatever be the reason, however, they suggest that a study of the metallurgy of wheel irons offers possibilities of improvement by which the higher values obtained in these tests might be consistently maintained or possibly exceeded in the future.

(2) No distinct relation was apparent between the ultimate strength of wheel iron and either the Brinell or the scleroscope hardness, nor could a constant relation be determined between the Brinell and scleroscope results.

(3) In forcing the 625-lb. and 725-lb. M.C.B. or Washburn type of wheel on an axle the maximum tensile strain

or stress is a tangential or "hoop" strain or stress occurring at the bore, and it may be on either the inner or the outer face of the wheel.

Tensile and compression stresses as high as 17,000 lb. were observed.

(4) In pressing the 740-lb. arch plate wheels on the axle the maximum tensile strain or stress was a tangential strain or stress on the inner face and at the bore. In general the tensile stresses on either face of the wheel were a maximum next to the bore and steadily decreased toward the tread.

Stresses observed were as high as 16,800 lb. for tension and 13,700 lb. for compression.

(5) In the regions of the chaplets and core holes, pressing the wheel on the axle causes tensile strains in a tangential direction which are of lesser intensity than, but approach in magnitude to, those at the bore.

(6) The stresses and strains in the brackets which are produced in a radial direction by mounting are relatively insignificant.

(7) The strains caused by mounting the wheels on the axles, when mounting alone is considered, are greatest in the hub near the axles. These strains, although apparently high in the case of the greatest values recorded, are steady and not repeated as is the case with the majority of strains produced in service. Moreover, these highest strains extend through a comparatively thin layer of metal near the axle and this strained layer is backed by other layers of less strained metal.

(8) In general the static load is transmitted from hub to rail, mainly through the outer plate, while the smaller portion of the load goes through the inner plate. This effect is more pronounced in the 740-lb. arch plate than in the 725-lb. M.C.B. type of wheel. This division of the load seems desirable in that the inner plate may be considered as affording a reserve capacity for the purpose of absorbing

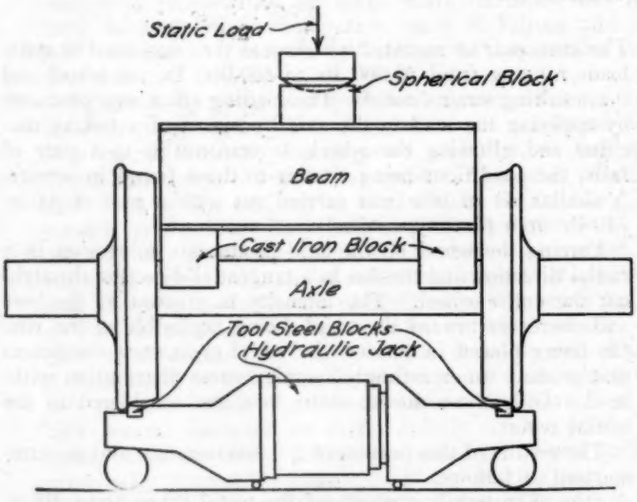


Fig. 2—Method of Applying Static Load and Flange Pressure

the effect of the side thrust exerted on the flange when rounding curves.

(9) Pressing the wheel on the axle is much more effective in producing stress or strain within the wheel than the normal static load, and it therefore follows that the addition of the normal static load does not greatly add to or otherwise modify the more important of the existent strains caused by mounting.

(10) Abnormally heavy loads, in the absence of impact, side thrust, etc., may be sustained by wheels without increasing the normal strains, already existent, to such an extent as to seriously stress the wheel.

(11) The maximum strains reported, caused by the combined effects of mounting and static load, appear large when expressed in terms of the stress that would exist if the material were subjected to simple tension or simple compression. As previously stated, these strains are produced in the main by the mounting load and the more important strains are those of tension, which in general are greatest near the bore of the wheel. The character of the strains and the backing of the material most strained by less strained material, probably makes possible without injury to the material greater strains or deformations than would be

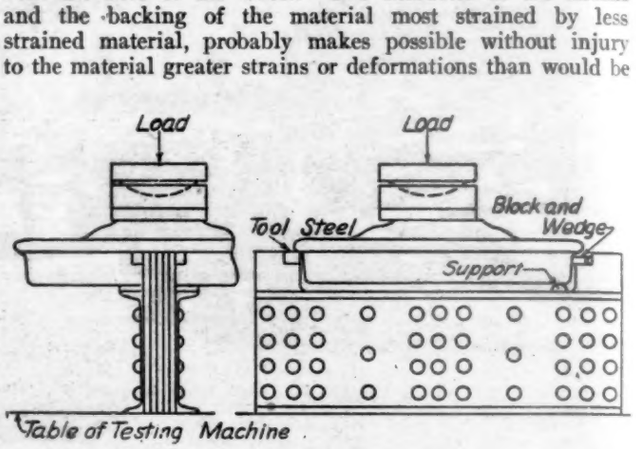


Fig. 3—Apparatus Used to Determine Strength of Flanges

allowable in the case of material not so supported and subjected to simple tensile stress.

Combined Effect of Mounting, Static Load and Flange Pressure

The equipment used to apply the loads for determining the combined effect of wheel fit, static load and flange pressure is shown in Fig. 2. It consisted of a 200-ton hydraulic jack supported on rolls which in turn were supported on the bed of a 600,000-lb. testing machine. Castings fastened to each end of the jack had hardened steel blocks inserted near their ends, the upper sides of these blocks having contours similar to the head of a rail. A pair of wheels previously mounted on an axle rested on these steel blocks. By means of a block with a spherical seat, a beam, and two cast iron blocks resting on the axle, the static load was transmitted to the axle, thence through the wheels and on down to the bed of the testing machine. After a static load of the desired magnitude had been applied, a flange pressure of the desired amount was obtained by means of the hydraulic jack.

The strains were measured on a series of 2-in. gage lines, both radial and tangential, extending from the hub to near the rim on both inside and outside faces of the wheel tested. The static loads employed were 13,050 lb. and 25,450 lb. After the stresses due to these loads had been ascertained and while the static load of 25,450 lb. was still maintained, a side thrust or flange pressure of 8,000 lb. was added by means of the hydraulic jack. Additional readings were taken and the flange load then increased to 16,000 lb. and afterwards to 32,000 lb. The last condition, namely, 25,450 lb. static load and 32,000 lb. flange thrust, was considered to be representative of the normal maximum loading that might occur in service.

The compressive stresses found for the various load conditions were relatively unimportant. The maximum corresponding simple tensile stress—18,400 lb. per sq. in.—was due to mounting and was found at the gage-lines nearest the hub on the inner face. The application of static load and flange pressure did not materially affect this stress.

Strength of Chilled-Iron Car Wheel Flanges

The apparatus used in making tests of the strength of the flanges consisted of a beam built up as shown in Fig. 3.

This beam was placed on the weighing table of a testing machine, and the wheel was supported thereon at opposite points on a diameter, at one side by a piece of tool steel pressing against the flange, and at the other by a semi-circular piece of steel supporting the tread. The location of the point of application of the load on the flange could be varied by means of a block and wedge applied to the tread at a point diametrically opposite. This block and wedge further acted to take the horizontal pressure due to the angularity of the flange at the point of load application. The load was applied to the wheel, through a block with a spherical seat.

The flanges were of various shapes and include specimens

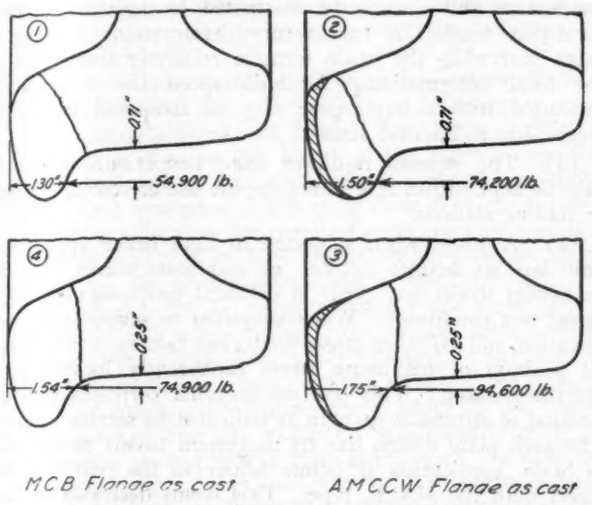


Fig. 4—Typical Results of Flange Tests on Special Wheel with Standard and Reinforced Flange

representative of both new and worn wheels. Among them were wheels with the standard contour recommended by the Master Car Builders' Association, and others with the reinforced flange suggested by the Association of Manufacturers of Chilled Car Wheels to replace the present M.C.B. standard flange. In addition, there were tests made on wheels with flanges ground to represent various stages of wear, and also on two wheels which were worn out in service.

In order to obtain information of value regarding the effect of additional metal in the flange region, an attempt was made to eliminate other differences by using wheels cast from special patterns, in which one-half of the circumference had the standard M.C.B. flange and the other half had additional metal on the inner face. Three types of wheels were thus cast and from these the effects in both new and worn wheels of, first, increasing the thickness of the flange, second, increasing the thickness of the tread, and, third, increasing the thickness of both flange and tread simultaneously, were determined. To make the comparisons still more direct the loads were in every case applied to the flanges of these specially prepared wheels on a radius midway between the points where two adjacent brackets entered the tread, thus eliminating as far as possible the complex effect of the support of the brackets. In addition, the flange pressures were in each case applied at identical distances below the tread, thereby removing the effect of difference in the moment of the load.

Conclusion in Regard to Wheel Flanges

The conclusions to be drawn from the tests made to determine the ultimate strength of the wheel flange may, within the limits of these tests, be summarized as follows:

(1) When the flange pressure is applied to wheels with badly worn flanges on a radius midway between the points where two adjacent brackets enter the tread, the ultimate strength of the flange is an inverse function of the distance of the point of pressure application from the tread, that is, the greater the distance the smaller the ultimate strength.

(2) This inverse relation does not hold in the case of new or slightly worn flanges, neither does it hold in the case of either new or worn flanges if the point of pressure application is on the same radius as that on which a bracket enters the tread. In this case it was found in some of the tests that the bracket apparently strengthened the flange, while in others a weakening of the flange was observed, these conditions indicating a complex supporting effect due to the bracket.

(3) The addition of 3/16 in. of metal to the back of the present standard flange, as proposed by the Association of Manufacturers of Chilled Car Wheels, increases the ability of the flange to withstand side thrusts. This increased strength was plainly shown in the tests of the specially prepared wheels, in which one-half of the circumference had the present standard M.C.B. flange and the other half the proposed additional flange thickness. The wheels showed an increased flange strength due to the additional metal of from 10 to 90 per cent in the case of badly worn flanges, and from 26 to 49 per cent in the case of slightly worn or new flanges.

(4) In the case of the wheel having one-half of the circumference cast with the standard M.C.B. tread and the other half with the 3/16 in. of additional metal on the inner and under side of the tread, the results were negative, inasmuch as the half with the additional metal showed decreased ability to withstand side thrust. Although tests on one wheel cannot be taken as conclusive, if further tests confirm these results, the indication would be that it is possible to add metal in such a way that not only no increased flange strength results but a decreased flange strength may actually be caused. If this be taken as proved, then there probably exists a relation or ratio between flange and tread thickness which will result in a maximum flange strength for a particular thickness of either flange or tread. In that case, if a wheel be cast with the ideal ratio of tread to flange thickness for, say, a given thickness of flange, the addition of metal to or the subtraction of metal from the tread will not only not increase the flange strength but may even decrease it.

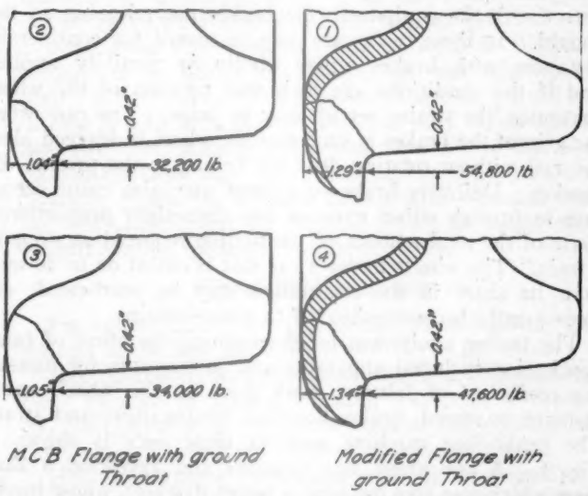


Fig. 5.—Typical Test Results on Special Wheel with Standard Flange and with Reinforcement on Flange and Tread; Throat Ground to Represent Worn Flange

(5) The simultaneous addition of 3/16 in. of metal to both flange and tread was not found to alter the ability of the flange to withstand side thrust. As the addition of 3/16 in. to the flange alone gave added strength, this result would tend to confirm the conclusion reached in (4). The simul-

taneous addition of 3/16 in. of metal to the flange and ⅜ in. to the tread was found to result in an appreciable increase in the ultimate strength of the flange. The weight of metal added was about 37 lb. or 5.1 per cent of a 725-lb. wheel, whereas the increase in flange strength resulting therefrom ranged from 40 to 70 per cent. An important feature of this case is that the advantage of the additional metal apparently does not disappear as the wheel approaches the condemning limit on account of flange wear.

(6) The general conclusion to be drawn from the results of these tests is that the flange strength of the chilled iron wheel can be increased to keep pace with probable future service requirements by a proper placing of additional metal in the tread and flange.

Stresses Due to Brake Application

The application of a brake shoe to the tread of a car wheel for the purpose of retarding the car produces, through friction between the brake shoe and wheel, localized heating of the tread, which in turn sets up temperature gradients and consequently strains or deformations throughout the wheel. In descending important grades like those of mountainous regions, the speed of a train may be controlled almost wholly by the brakes. When the grade is steep and of considerable length, the amount of energy destroyed by means of friction between the wheel and shoe is very large. This results in high temperatures at the tread of the wheel with comparatively low temperatures at the hub. The differences in temperature between rim and hub thus produced may result in severe strains within the wheel. When operating trains on long descending grades, some roads establish thermal or cooling stations at which stops are made in order to prevent excessive temperature gradients and the consequent strains within the wheels, and further, to allow temperatures to become equalized within the wheels, thereby reducing the strains or stresses already set up. Wheels of trains operating on level track may also be subjected to excessive differences in temperatures between wheel rims and hubs through dragging brakes. This condition arises with defective brake equipment, the brakes not releasing as they should. In these cases cars may be moved for considerable distances with brakes either wholly or partially applied, and if the conditions are such that rotation of the wheels continues, the strains set up may be large. The case where the grip of the brakes is such that the wheel is dragged along the rail without rotating does not belong to the present discussion. Defective brake equipment may also cause certain cars to furnish either more or less than their proportionate share of the total amount of retardation required in stopping a train. The wheels under a car that is called on to do more than its share in the retardation may be overheated, and consequently become subjected to severe strains.

The testing equipment for determining the effect of brake application included apparatus and instruments for measuring coefficient of friction, work done on the wheel, speed, distance traversed, brake-shoe loss, temperature, and strain. The brake-shoe machine used in these tests is shown in Fig. 1. A car wheel was mounted and keyed on a shaft upon which was also mounted a heavy flywheel, whose inertia together with that of the car wheel and shaft was such that the kinetic energy developed was equivalent to that found in a single wheel of a 30-ton capacity moving car. The shaft with the flywheel and car wheel was driven by a 120-hp. steam engine through a suitable clutch. The brake shoe was applied at the top of the wheel, and the pressure of the shoe upon the wheel could be set at any desired amount by a system of levers and weights. The tangential pull required to hold the shoe in position at the top of the wheel was measured by means of a flat spring-type recording dynamometer.

The temperature at various positions in the rotating wheel was measured by means of thermocouples and a slip-ring apparatus. The strains or deformations in the wheel were measured with a strain-gage. Linear thermal expansion of specimens cut from the wheels was determined by a special method devised for the purpose. The results of this investigation may be summarized as follows:

(1) The stresses in chilled iron wheels set up by temperature gradients due to brake application are transmitted mainly through the outer plates, the strains or stresses on the inner face being relatively small.

(2) At slow speed the temperature gradients are small, sufficient time elapsing to allow the heat to travel inward by conduction and also to be dissipated by radiation. This condition results in temperature deformations forming a large part while the strain forms a relatively small part of the total deformation. At high speed the deformation measured with a strain-gage may be composed wholly of strain due to internal stress.

(3) The stresses resulting from temperature gradients may be kept within safe limits, by the use of cooling periods or cooling stations.

(4) A wheel when subjected to light brake application only has no definite position of maximum strain, i.e., the maximum strain may occur at different positions under different test conditions. When subjected to severe brake application and no other stress-producing factors, a wheel has its position of maximum stress consistently located at a definite position. This position may not correspond to the position of minimum strength as indicated by service failures. The arch plate design has its maximum tensile strains due to brake application at points nearer to the center of the wheel than the M.C.B. type. This seems desirable in that this type of strain may then be counteracted by the strains of opposite kind produced by forcing the wheel upon the axle. This condition may partially explain the better service results obtained with the arch plate type of wheel.

(5) Prolonged and excessively heavy brake application may cause strains of sufficient intensity to crack either chilled iron or steel wheels. This emphasizes the necessity for careful attention to operating conditions of braking apparatus in both level and mountainous regions.

Coefficient of Friction and Brake-Shoe Wear

A considerable amount of data relating to brake-shoe wear and to the coefficient of friction between brake shoes and chilled iron wheels was obtained in connection with the tests to determine the strains in the several wheels. A few data of similar nature were also secured for a steel wheel. Some additional tests were made to determine the relative values of the coefficient of friction and the shoe wear on steel and chilled iron wheels, respectively. These tests were confined to the range of shoe pressures and speeds found in ordinary freight service.

Car-wheel friction tests as a rule are made for the purpose of determining the average value of the coefficient and the shoe wear in stopping the wheel from some predetermined speed. The special coefficient of friction tests here reported differ therefrom in that friction and wear were determined with the wheel rotating at a constant speed. In these tests the same brake shoe was used throughout on comparative studies of a chilled iron and a forged steel wheel under identical test conditions, in which the shoe pressure ranged from 500 to 3,000 lb. and the speed from 10 to 50 miles per hour. To prevent overheating, the brake shoe, after having been applied to the wheel for a number of revolutions, was raised for cooling. At 5 miles per hour the cycle consisted of approximately 190 revolutions of the wheel with the shoe applied and 210 revolutions with the shoe raised. At all other speeds the cycle was 190 revolutions of the wheel with the shoe applied and 610 with the shoe raised. Since 20

cycles comprised a test, the shoe was in contact with the wheel for approximately 6.25 miles.

The highest values of the coefficient of friction occur at low speeds, and vice versa. At a given brake-shoe pressure the coefficient decreases rapidly as the speed is increased from 10 to 30 miles per hour; the decrease in the coefficient is small or zero with further increase in speed. With the speed constant there also appears to be a decrease in the coefficient as the brake-shoe pressure is increased. The brake-shoe wear on the chilled iron wheel, at shoe pressures of 2,000 to 3,000 lb., becomes greater as the speed is increased up to 40 miles per hour; between 40 and 50 miles per hour the shoe wear is practically constant. With the speed constant the shoe wear is greater as the shoe pressure is increased.

The values of the maximum and minimum coefficient show that during a test the coefficient of friction may vary considerably. In only three tests (with 1,000, 2,000, 2,500-lb shoe pressure at 5 miles per hour) of the entire series did the mean coefficient of friction for the steel wheel exceed that of the chilled iron wheel. For these three cases the values were so nearly alike that for practical purposes they may be considered equal. In each of the remaining tests the coefficient found for the chilled wheel was greater than that for the steel wheel. In 35 tests (excluding the three previously mentioned at 5 miles per hour) the friction between the brake shoe and the chilled iron wheel averaged 21 per cent higher than the friction between the same shoe and the steel wheel. In other words, chilled iron wheels, under the test conditions as to kind of shoe and within the speed and pressure ranges occurring, are apparently more effective in retarding cars or destroying energy than steel wheels. The inference might be drawn that due to its greater retarding properties the shoe wear on the chilled iron wheel would be greater than that on the steel wheel. Although individual tests may be selected in which the shoe loss on the steel wheel is considerably less than that on the chilled iron wheel, the whole series of tests shows that for 3,800 million foot-pounds of work done on each wheel, the loss with the steel wheel amounted to 14.98 lb., whereas that with the chilled iron wheel was 11.18 lb.

Group Insurance on the Delaware & Hudson

THE DELAWARE & HUDSON COMPANY has issued a statement reviewing the operation of its several forms of employee insurance during 1922, including unemployment insurance; all the different classes forming probably the most comprehensive protection afforded by any employer in the country. Together with the company's pension system, which at the end of the year carried 218 employees on the rolls, the insurance plan represents the working out of President Loree's efforts during several years to protect the company's employees against the five major disasters of life, namely, sickness, accident, death, unemployment and old age.

The insurance was begun on April 1, 1922. Under group policies written by one of the largest companies a large proportion of the 13,000 employees who came within the group insurance specifications were insured from that date against some or all of the following risks: 1, death, and total disability; 2, sickness; 3, accident; 4, accidental death and dismemberment, with double compensation in case of death occurring in the course of duty.

Ordinary death and total disability insurance is provided by the company, without charge to the employees, in the sum of $250 for employees of over six months' and less than two years' service; and $500 for those of more than two years' service. This free insurance is supplemented by extensions on a contributory basis. An employee may secure an additional $250 or $500 by paying the very low premium for this additional amount. On policies from $1,000 up to a maximum of $5,000 the company pays a portion of the premium, so that any employee co-operating with the company under this plan can have a total insurance of $1,000 at a cost of 60 cents a month; $2,000 for $1.20 a month; $3,000 for $1.80 a month; $4,000 for $2.40 a month, or $5,000 for $3.00 a month. The total insurance allowable in any case is the multiple of $200 nearest to the average annual wages of the employee for the two preceding years.

Loss of wages by sickness is covered by a policy providing benefits of $15 a week for a period of 26 weeks, beginning with the eighth day of incapacity. The premium on this insurance, which is $1.26 a month, is paid wholly by the employee.

Loss of wages by accident, exclusive of injuries which are covered by workmen's compensation laws, is covered by a policy carrying payments of $15 a week for a period of 26 weeks. Premiums for this insurance, amounting to 24 cents a month are paid wholly by the employee. This accident policy covers the employee against accidents during the entire 24 hours of each day and supplements the protection afforded by the compensation laws, which, in principle, cover only working hours.

Extra-hazard insurance covering death or dismemberment from any cause, including accidents covered by compensation laws, and carrying a double indemnity for death occuring in the course of duty, may be taken by employees under 60 years of age, at the rate of $4 per $1,000 of indemnity, this premium being paid wholly by the employee.

Unemployment insurance is open to employees who are carrying two of the three contributory forms (additional life, sickness or accident). This unemployment protection is based on President Loree's view that one of the most constant irritations in the minds of many employees is the feeling of resentment, whether well or ill founded, against the foreman immediately directing their work. The indemnity to the discharged worker amounts, from another point of view, to a penalty on the company when a foreman discharges a worker for an insufficient reason. It was believed that by giving the employee this assurance of at least partial support in case he had to hunt a new job, not only would foremen be deterred from making capricious discharges, but the employee, realizing this penalty on caprice on the part of the foreman, would be disposed to minimize personal incidents between himself and his foreman which he might otherwise magnify into a personal injury or abuse.

Eight Thousand Insured

Figures for all forms of insurance, from April 1, 1922, to the end of the year, are as follows:

Life insurance, including both free and contributory policies: number of claims handled, 94; total benefits paid, $97,050; number of employees insured free, 8,176; number carrying additional contributory insurance, 6,665.

Health insurance (premiums paid by employees): final settlements made, 263; claims drawing benefits at end of year, 36; number insured, 4,328; total benefits paid, $30,111.

Ordinary accident insurance: final settlements made, 43,- claims drawing benefits at end of year, 8; number insured, 4,884; total benefits paid, $3,787.

Accidental death and dismemberment insurance: claims handled, 8; total benefits paid, $13,100; number insured, 3,821.

Unemployment insurance: claims handled, 8; benefits paid on five claims, at $90 each, and three claims at $60 each; $630.

Total benefits of $144,678 were paid on a total of 460 claims under all heads.

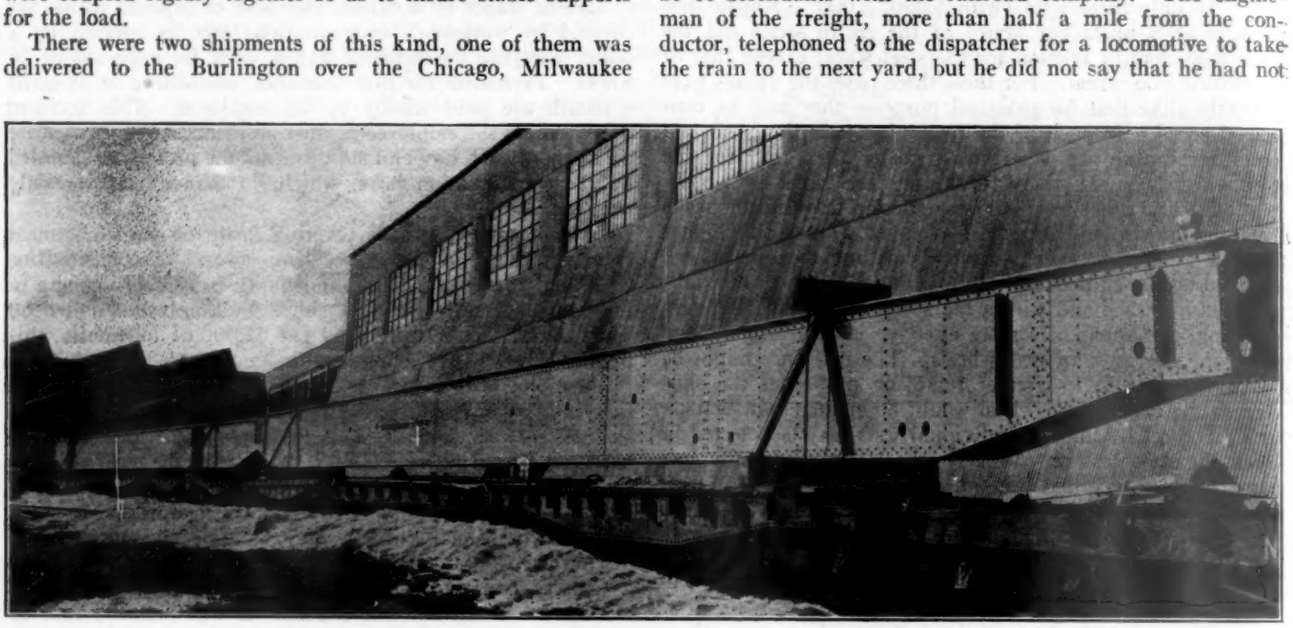
Two Girders Requiring Nine Cars

THE TWO LONG GIRDERS shown in the illustration, which is from a photograph sent to the *Railway Age* by the shipper, the Pawling & Harnischfeger Company, of Milwaukee, Wis., were sent recently from the company's shop at Milwaukee to Eola, Ill., near Aurora, where they are to be used in gantry cranes being built for the Chicago, Burlington & Quincy.

Each of these girders is 165 ft. long over all, and the two together required nine platform cars, as shown. These girders were made at the Pawling & Harnischfeger shops, and it is believed that they are the longest single-piece shipments that ever have been moved by rail. Each girder weighs about 36 tons and is supported on the cars by two bolsters, one at each end, as shown. The cars supporting each girder were coupled rigidly together so as to insure stable supports for the load.

There were two shipments of this kind, one of them was delivered to the Burlington over the Chicago, Milwaukee & St. Paul and the other over the Chicago & North Western.

These girders were loaded under the supervision of Percy Streeter, of the Pawling & Harnischfeger Company.



Two Pieces of Freight Extending 330 Feet, Plus

Report on Collision at Alexis, Ohio

W. P. BORLAND, director of the Bureau of Safety of the Interstate Commerce Commission, reporting on a collision on the Pere Marquette, near Alexis, Ohio, on February 3, finds varied negligence and misconduct, constituting "a condition which demands the thorough consideration of the officers of the company." The facts in brief were as follows:

Southbound freight train, extra 114, standing on the main track, not protected by flag, was run into at the rear by southbound passenger No. 32, which was moving at from 35 to 50 miles an hour. The caboose and five freight cars were demolished and the passenger locomotive badly damaged. Two employees were killed, a brakeman who was in the caboose and a student fireman who jumped off the engine. Four other employees were injured. This collision occurred about 8:56 a. m. in clear weather. The passenger train had just traversed a long tangent and had traveled about 175 ft. on a two degree curve to the left. The freight had been standing at this point about two hours, the engine having failed, because of lack of steam; and no flagging had been done.

The inspector lays the responsibility on the conductor, primarily, and also partly on the train dispatcher. A manual block system is in use for the protection of the rear of passenger trains but it is not used for anything else.

It appears that it is the practice on this road for trainmen to suspend all their activities at the expiration of 16 hours on duty, without instructions from the dispatcher; and this collision discloses the remarkable condition that trainmen in such cases leave a train wholly unprotected. These men had a feeling that if the government should begin a prosecution for disobedience of the 16-hour law, they would be co-defendants with the railroad company. The engineman of the freight, more than half a mile from the conductor, telephoned to the dispatcher for a locomotive to take the train to the next yard, but he did not say that he had not put his train in the sidetrack; the conductor appears to have been satisfied that the engineman had given sufficient notice of the presence of the train at that point, while the dispatcher assumed that the train was on the siding. The conductor assumed that the dispatcher would notify the passenger train. The conductor might himself have spoken to the dispatcher easily as there was a telephone near him. The dispatcher knew that the crew had been on duty nearly 16 hours yet made no inquiries. "Conductor Elliott's statement indicated that he had no proper realization of the responsibilities of his position and that he paid practically no attention to providing for the safety of his train." The dispatcher is censured for assuming that the freight was on the siding without having definite information to that effect. At 8 a. m. the dispatcher went off duty and failed to give the next dispatcher any information about the disabled train. The relieving dispatcher also should have discovered the situation, as the last record of the freight was at Erie at 6:13 a. m.

The inspector says that he finds various lax operating methods and an absence of a proper spirit of co-operation; a condition which demands thorough consideration by the officers of the company. The engineman and fireman of the freight had been on duty nearly 18 hours; the rest of the crew had relieved themselves at the end of 16 hours. The report says nothing about the past records of any of these men.

Fuel Consumption of Oil Burning Locomotives*

Data Obtained on Southern Pacific Facilitate Comparison of Steam and Electric Motive Power

By A. H. Babcock
Electrical Engineer, Southern Pacific Railroad

PART I

WHENEVER ELECTRIFICATION of steam railways on a large scale is advocated, one of the principal arguments advanced is the large saving in fuel sure to result therefrom; in fact, this was the initial point of attack in the early days of the art—the early 1890's, for example—long before overtime of train and engine crews had become the very real expense in train operation it is today. Many attempts to get accurate information on locomotive fuel consumption have been made during the intervening years, for comparison with known electric locomotive performance.

Fuel consumptions of steam locomotives using coal cannot be analyzed as can those of electric locomotives, because

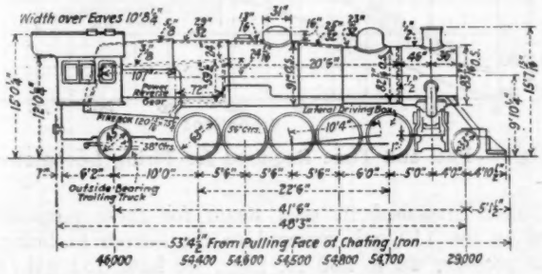


Fig. 1—Side Elevation of Locomotive No. 3614

it is impossible to obtain accurate measurements. When fuel oil is used, the possible accuracy of such measurements more nearly approaches that of electric operation, and much more precise determinations are possible.

By the use of accurately calibrated oil meters; by locating with reference to track conditions, points at which meter readings shall be taken; by choosing an engine that has shown an average fuel performance under widely different operating conditions; by giving this engine loads as closely as possible to its rating; and by not changing the train consist over the run, an accurate measure of fuel consumption for any given piece of track—over a mountain, for example—can be had.

In connection with and bearing directly upon electrification possibilities, such a study has been made of the track over the Tehachapi Pass, where topographical and operating conditions are severe; also they are representative of mountain railways on the west coast.[1]

Engine No. 3614 was selected because the records of the fuel bureau showed it to be an "average performer" in through freight service. Its characteristics are given in detail, Tables 1 and 2. On every run a different engine crew handled the train, the selection being by the usual "first in, first out" method standard on the railway. A trained observer rode the engine and made all the readings. The train weights, taken from the yardmaster's reports at the initial points, were corrected, during the runs, for fuel and water consumed.

George McCormick, general superintendent motive power, Southern Pacific Lines, afforded every facility of his department in the prosecution of the work; he prepared the engine and made valuable suggestions.

The division officials inconvenienced themselves many times to permit a single engine train to run without change of load over a congested piece of track.

William Hood, for many years chief engineer, Southern Pacific, who located and constructed this line, named the points at which the track conditions change in significant fashion. It was found during the test runs that all engineers handled the trains very much alike, changing throttle or cutoff at or near the flags that had been placed at the points selected by Mr. Hood; from which it was evident that the points so chosen were really representative. The positions of all these reference points are given in Fig. 3. Meter readings and times were recorded at all grade changes, (marked by these flags, or by the natural marks at such points), and at all starts and stops. The fuel oil was metered through a new two-inch duplex piston type meter that had been calibrated by weight measurements corrected for temperature. In the final analysis all fuel measurements were reduced to 60 deg. fahr. Approximate water measurements were made, not to determine evaporation, but as correction factors on the train tonnage. Similar fuel corrections were made.

The train tonnage, then, is gross weight of train from engine pilot to caboose markers, everything included.

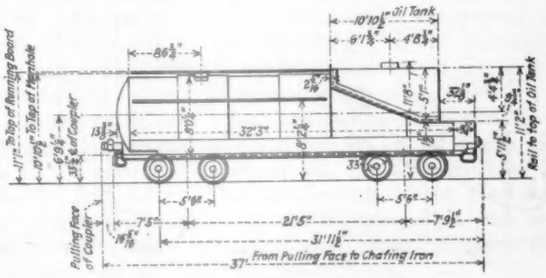


Fig. 2—Side Elevation of Tender

The result is a complete record of fuel consumption beginning with the enginehouse firing up and standby fuel consumption until the engine was called; while standing outside the house waiting for the train, testing brakes, during acceleration, running up and down the various grades, holding the train in sidings, and finally running down hill over long stretches of steep grade.

In the ordinary system of fuel records all fuel consumed in firing up, standing in the enginehouse and on the outgoing track up to the time the engineer assumes responsibility *i e.*, thirty minutes before he is called to leave the terminal,

*A paper presented at the spring convention of the American Institute of Electrical Engineers at Pittsburgh, Pa., on April 25. This is the first part of an article in two parts. It describes a method employed for securing an accurate measurement of the efficiency of an oil-burning steam locomotive in moving a 1,000-ton train over a given piece of track. The second part of the article will describe the manner in which the method was applied and will include the results obtained.

[1]See also TRANSACTIONS, American Institute of Electrical Engineers, Vol. XXXII, p. 1845, "Mountain Railway Electrification."—*Babcock.*

is charged to enginehouse service; all consumed from that time until the engine is placed on the incoming track at the end of the run is charged to road service.

Such records, brought probably to the highest state of perfection in the practise of the Southeern Pacific Company, give merely a method of distribution of charges between departments, provided a basis of comparison between present and past performances quite sufficient for economic operation in pre-war days, but by no means adequate in these days of intensive economic studies. No details of performance are uncovered.

TABLE I

SPECIFICATIONS FOR LOCOMOTIVE No. 3614

Cylinders	27½ in. x 32 in. stroke
Weight on drivers	273,000 lb.
Weight on front truck	29,000 lb.
Weight on trailing truck	46,000 lb.
Weight on engine loaded	348,000 lb.
Driving axle journals, front	10 in. x 20 in.
Driving axle journals, main	12 in. x 22 in.
Driving axle journals, others	10 in. x 13 in.
Trailing truck, journals	8 in. x 14 in.
Engine truck journals	6 in. x 12 in.
Boiler tubes, diam. of	2 in. and 5⅜ in.
Boiler tubes, length of	20 ft. 6 in.
Boiler tubes, number of 2-in	279
Boiler tubes, number of 5⅜ in	40
Heating surface of boiler tubes	4,130 sq. ft.
Heating surface of superheater	972 sq. ft.
Equiv. H. S. of superheater	1,458 sq. ft.
Heating surface of firebox	327 sq. ft.
Equiv. heating surface, total	5,915 sq. ft.
Firebox, length inside	120⅛ in.
Firebox, width inside	75¼ in.
Water space sides, back and front	5 in.
Grate area	63 sq. ft.
Boiler pressure	200 lb.
Equiv. heating surf. to cyl. vol	269
Adhesive wt. to equiv. H. S	46.2
Tractive effort to adhesive wt	0.2392
Adhesive wt. to tractive effort	4.18
Adhesive wt. to total wt	0.785
Tractive effort x diam. of drivers to equiv. heating surface	695.0
Equiv. H. S. to tractive effort	0.0906
Total wt. to equiv. H. S	58.8
Equiv. heat surf. to grate area	93.9
Tractive power (M. E. P. 85 per cent)	65,300

These may be divided into three groups:

1. Variation of fuel used in firing up with respect to feed water temperatures, *i. e.*, losses independent of the manner in which the engine is used after steam is raised.

2. Fuel burned in holding the engine under steam at terminals or on the road; *i. e.*, losses dependent upon operating staff efficiency rather than upon tonnage, and independent of speed.

3. Fuel consumption while moving; accelerating, running, entering and leaving sidings, etc., all of which are dependent largely upon tonnage, and speed. With known tonnage, as in these tests, the ton-mile fuel cost becomes known over widely varying road and running conditions.

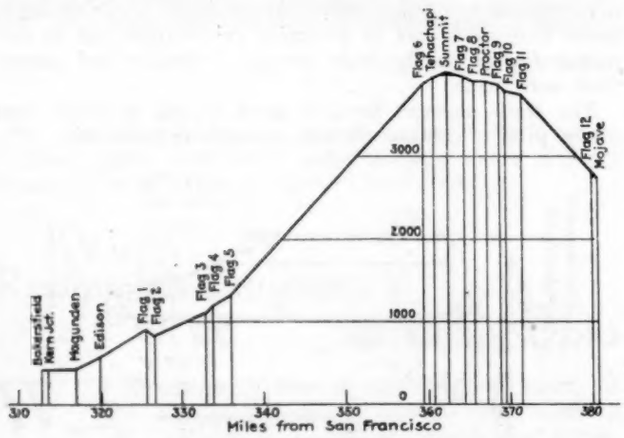


Fig. 3—Profile Map, Bakersfield to Mojave

Group 1. For this determination the boiler was filled to ⅓ gage glass (engine in enginehouse), with water at 120 deg. fahr. Steam for oil atomizer and blower was taken from the house steam lines until the boiler pressure reached 70 lb. gage. Fig. 4 shows fuel with respect to boiler water temperature and steam gage pressure. A second curve shows fuel consumption with time. Evidently not all the heat in the fuel reached the water at first because of the cold firebox lining.

From other tests it has been determined that the atomizer and blower add 14 per cent to the fuel consumption. Therefore, if 14 per cent of the 84 gal. used up to the time when the boiler furnished its own steam for these purposes be added to the 119 gal. metered to the burner to bring the boiler pressure up to 200 lb. gage, we have 131 gal., total fuel used to raise steam with feed water at 120 deg. fahr.

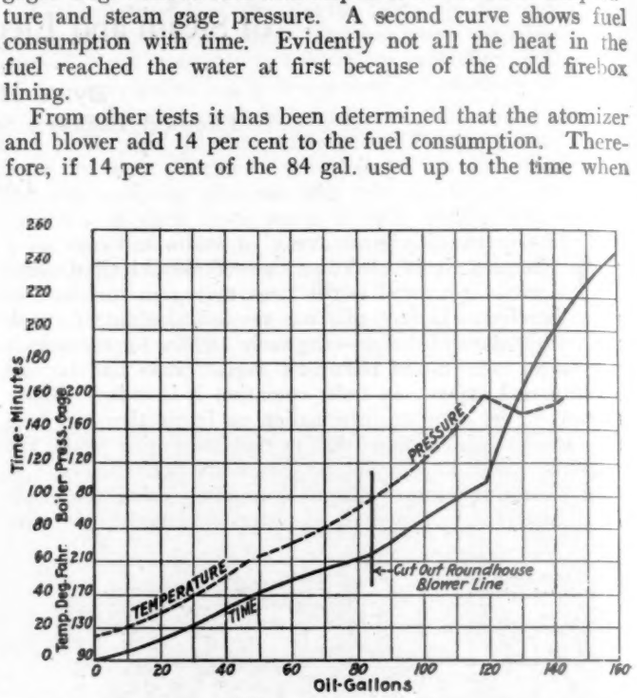


Fig. 4—Fuel and Time Required for Firing Locomotive

If it be assumed, as seems reasonable all things considered, that the fuel consumption for all practical purposes is proportional to the rise in temperature, the fuel per degree rise is 47/(210-120), or 0.522 gal.; from which then can be determined value of storing the heat from boilers being blown down for washing, to use in firing up other engines for the road. Thus, to fire up with feed water at 60 deg., ordinary hydrant water, costs 1.14 [0.522 (212 — 60) + (84 — 47)] + (119 — 84) = 167 gal. Similarly for 180 deg. feed water, from a hot water boiler washing and filling plant; 1.14 [0.522 (212 — 180) + (84 — 47)] + (119 — 84) = 96 gal.

With fuel oil at $1.50 per bbl. the 71 gal. saved per engine fired up amounts to $2.54, but the money saved by such procedure is even more than is apparent from the figures, because the time of turning an engine washed and filled with hot water is, by record, 3½ hours less than the 7½ to 8 hours required when cold water is used. Heavy power represents an investment worth at least $4.00 per hour. It

TABLE II

SPECIFICATIONS FOR 10,000-GALLON CYLINDRICAL TENDER

Capacity of fuel oil	3,120 gal.
Capacity of water	10,030 gal.
Weight of tender empty	64,900 lb.
Weight of 10,030 gallons of water	83,600 lb.
Weight of 3,120 gallons of fuel oil	24,960 lb.
Weight of tender loaded	173,460 lb.
Tender axle journals	6 in. x 11 in.
Weight of truck	8,580 lb.
Height from top of rail to bottom of tank (loaded tender)	2 ft. 9¾ in.
Width over front steps	9 ft. 6 in.
Width over back steps	10 ft. 2½ in.
Extreme width over end sills	9 ft. 10 in.
Diameter of tank outside	8 ft. ¼ in.

could not be rented for this figure. Hence the time saved adds $14.00 per engine turned to the fuel saved, and the total economy then is $16.54 per engine turned.

Group 2. The upward branch of the time-oil curve, Fig. 4, shows the fuel required to hold an engine under steam while standing in the enginehouse where these tests were made, to be $60(159 - 119)/(246 - 108) = 17.4$ gal. per hour. It is fairly representative of large engines standing in a well kept enginehouse, no auxiliaries running.

Power of this class has air reverse gear; hence, if the engine is standing where occasional movements must be made, at least one air pump must be cut in. During the tests it was determined by placing this engine in the open yard, that oil was used at the average rate of 36.6 gal. per hour. Air temperatures during this period ranged, roughly, from 20 deg. to 50 deg. fahr., therefore $36.6 - 17.4 = 19.2$ gal. is the excess fuel consumed per engine-hour when standing in the open in ordinary weather.

Similarly, the fuel cost of standing on sidings with full tonnage train, is found to be 42.8 gal. per hour. Since no steam was used for heating in either case, $42.8 - 36.6 = 6.2$ gal. is the fuel cost per hour of maintaining air pressure in the train line, ready for service.

Group 3. The results obtained for the first two groups are evident upon even a cursory study of the curves; but to

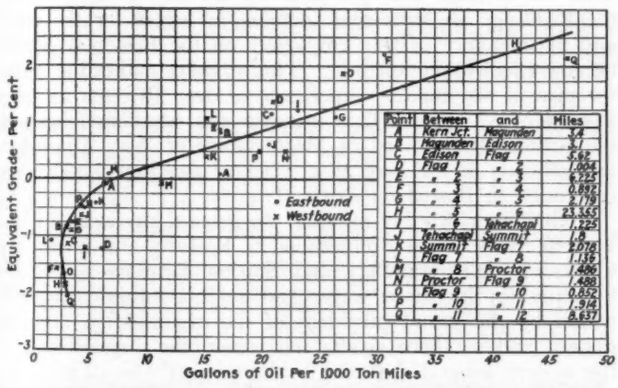

Equivalent Grade - Per Cent
Gallons of Oil Per 1000 Ton Miles
• Eastbound
× Westbound
Point Between and Miles
A Kern Jct. Nagundon .4
B Nagundon Edison .7
C Edison Flag 1 5.62
D Flag 1 " 2 1.004
E " 2 " 3 1.225
F " 3 " 4 0.892
G " 4 " 5 2.719
H " 5 " 6 23.365
I " 6 Tehachapi 1.225
J Tehachapi Summit .8
K Summit Flag 7 2.078
L Flag 7 " 8 1.132
M " 8 Proctor 1.486
N Proctor Flag 9 1.488
O Flag 9 " 10 0.852
P " 10 " 11 1.914
Q " 11 " 12 0.657

Fig. 5—Fuel Consumed per 1000 Ton Miles on Various Grades

obtain results for the third group a more rigid treatment is necessary. The reduction of the test observations in these determinations occupied many weeks full time of the two observers (who rode the engine alternately during the tests), C. M. Barbour and R. S. Twogood, assistant engineers, Southern Pacific Company. Mr. Twogood is responsible for the details of the test and the analysis of the results. To him acknowledgments are due for the following, most of which are either taken literally or abstracted freely from his report.

In the reductions of the observations, the fuel oil density is taken at 0.96; the heat content 18,000 B. t. u. per pound. The constants to correct the meter readings for meter error and to reduce to standard temperature, 60 deg. fahr., are:

Oil Temperature	Meter Constant
130 deg.	0.949
120	0.952
110	0.956
100	0.959
90	0.965

The time, fuel meter reading, fuel temperature, and location of train, were recorded at every start, grade change or other important point, and stop. The speeds were determined by counting engine driver revolutions. All grade changes at other than station points were marked by white flags—see profile, Fig. 3. Grade compensation for curvature is applied at 0.04 per cent grade per degree of curvature. The equivalent grades eastbound and westbound for the same section of track obviously are of opposite sign, and of different numerical value.

From the log sheets of the trip were tabulated: fuel metered, fuel consumed, fuel and water in tender; time running at normal speed, running slowly and standing. These sheets then were reduced to show for every section of the track: the train weight corrected for fuel and water consumed, the times between sidings, running through sidings, running between stations or flag points, and standing. Then by combination of these elements there were deduced: Total train resistances, horsepower hours at drivers, thermal horsepower-hours based on actual average thermal efficiency for the trip, and computed fuel vs. actual fuel burned. Based on Schmidt's tables, the train resistance for level tangent track was taken at 7 lb. per ton. The average thermal efficiency was determined from the total horsepower-hours and the fuel burned when moving over sections where the total resistance was positive. A fair average standard time and fuel used to fire up, stand by, test air, and put engine away, were assumed for all trips.

The average gallons of fuel per thousand ton-miles, in both directions, for every section of tracks, but not corrected for variations in speed within a section, were determined under actual operating conditions of the test, and are shown in Fig. 5 plotted against equivalent grade; wherein the curve as drawn has been adjusted to give fuel requirements for constant speed. Thus is shown the fuel cost of acceleration, and how, in the stop, provided the brakes are not used, a large proportion of the work done in acceleration is made useful in moving the train over the track. This is indicated by points on the left of the curve; points on the right show increase fuel consumptions during acceleration.

Scrip Coupon Order Enjoined and Postponed

A PERMANENT INJUNCTION against the enforcement of the order of the Interstate Commerce Commission prescribing the use of interchangeable scrip coupon tickets, to be sold at a reduction of 20 per cent, after May 1, was issued on April 23 by three judges of the United States district court for the district of Massachusetts, sitting at Boston, who held that the order must be annulled because issued without warrant of law. The injunction was asked by the eastern railroads on that ground and also on the ground of the unconstitutionality of the amendment to the interstate commerce act under which the commission issued the order, but the latter contention was not sustained by the court.

The western roads, which had asked the commission for a reargument, which it denied, on April 24 sent a telegraphic petition to the commission asking that the effective date of the order be postponed. The commissioners held a conference on Tuesday afternoon and on Wednesday it was announced that the order had been modified to postpone the effective date from May 1 to January 1, 1924.

Plans have been made for an appeal to the Supreme Court of the United States, but it is not expected that the case can be argued before fall. The National Association of Traveling Salesmen's Associations also intends to join in the appeal.

The court finds that the commission, in issuing the order, attributed too much weight to the assumption that Congress had intended it to require a lower rate for the scrip tickets than the standard fare, although Congress had refrained from saying so and had merely directed that the commission prescribe a "just and reasonable" rate.

The essential part of the court's opinion is as follows:

"Although the carriers opposed any reduction in rates for

the scrip coupons below the standard rates, it is clear from the record that the commission proceeded on the assumption that the spirit and theory of the Congressional amendment required them to order the scrip coupons to be issued at reduced rates, at least in so far as such rates could not be deemed confiscatory. There is no finding in the record that would indicate that the commission, if it had exercised an independent judgment apart from what it conceived to be the plain spirit and theory of the amendment, would have ordered the scrip coupons to be issued at reduced rates. The only finding of the commission that could possibly be relied upon as indicating that the commission exercised an independent judgment is the statement in the majority report that 'in addition to the obvious spirit of the law, the record warrants the view that a coupon ticket at a reasonably reduced fare should be established, at least for an experimental period.' But this finding is followed by the statement that 'in no other way can the apparent purpose of the law be given practical effect.' It would seem fairly plain, therefore, that the furthest the commission goes in its findings is to conclude that the record might justify the issuance of coupons at reasonably reduced rates for an experimental period; but there is nothing to indicate that the commission, if it had felt free to exercise its own judgment, would have assumed the responsibility for establishing the reduced rate even for an experimental period.

"It is not entirely clear whether the majority of the commission acted under an interpretation of the amendment that it was mandatory upon them so to reduce the rates for interchangeable scrip coupon tickets, or upon an assumed desire of the Congress, though not expressed by the amendment in mandatory form, that they should do so. In our judgment the amendment is not mandatory in this respect. It does not prescribe that such coupons shall be issued at a reduced rate. Attempts to fix specific reduced rates by legislation were defeated. If the Congress had intended that some reduction should be mandatory, leaving only the amount thereof to be determined by the commission under the phrase 'just and reasonable,' such intent could readily have been expressed in clear language. The fair and natural interpretation of the language used by the Congress makes mandatory the issuance of such coupons at just and reasonable rates, but the ultimate if not the original determination of what shall be just and reasonable rates for such coupons is placed entirely upon the commission. If, therefore, the commission acted upon a different interpretation of the amendment, an error of law was the basis of its action and order. If, on the other hand, it acted upon the interpretation which we have found to be the correct interpretation of the amendment, but based its conclusions not upon its own independent judgment, but upon what it believed to be the spirit and purpose of the act, which, if it means something other than a sound interpretation of the act, must mean some supposed desire of the Congress, it acted contrary to the law in abdicating the functions vested in it.

"In either case its order is without warrant of law and for this reason it must be annulled."

As to the contention of the roads that the amendment is unconstitutional, in that in requiring the interchangeable scrip coupons it compels an interchange of credit between the railroads and thereby compels a service at the risk of complete loss, the court says that "under the present amendment the extent of such credit interchange is left to the commission and must of course be reasonable, but in requiring the interchange in respect to scrip coupons, the action of Congress must be upheld as a constitutional exercise of power within the aforesaid decisions."

The postponement of the date of the order pending an appeal is in accordance with the commission's usual practice in cases where orders of this kind are enjoined and it removes any possible question of reparation from the date of the order in case it should eventually be sustained. Chairman Meyer vigorously opposed the postponement.

Three Roads Grant Wage Increases to Common Labor

WAGE INCREASES for the track employees and other common labor on three roads, the decision of the clerks' brotherhood to apply for advanced schedules and the filing of a petition for a pay increase by the expressmen, have been the outstanding features of a week of unusual activity among the labor organizations. The Pennsylvania, the Philadelphia & Reading and the Boston & Maine were the lines which granted higher wage scales to their track employees and other common laborers. The increases on the Pennsylvania, which were confined to the Northwestern region, range from 1½ cents to 3½ cents an hour, and affect some 4,000 employees in the maintenance of way and mechanical departments. Negotiations are now in progress on the other regions of the Pennsylvania and similar increases are expected to be the outcome. The new upward revision of wage scales is the second to be negotiated between the Pennsylvania and its company union, the first having been effected last fall.

The Philadelphia & Reading increased the wages of its trackmen and common laborers on the right-of-way an average of two cents an hour. The amount of the increase ranges from one to three cents per hour on the various divisions of the Reading. A three-cent increase in wages for the track and maintenance of way employees on the Boston & Maine became effective on April 20. This advance makes the wages for men of six months' experience or over 40 cents an hour instead of 37 cents. This increase was negotiated between the United Brotherhood of Maintenance of Way Employees and officials of the road at a series of meetings which were concluded in Boston on April 21.

Following a two-day meeting, the general chairmen for the western roads of the Brotherhood of Railway and Steamship Clerks, Freight Handlers and Station Employees, decided to apply for increased wages and as this follows favorable action by the grand president of the organization and the eastern and southern general chairmen, the acquiescence of the western general chairmen to this project was all that was needed to bring about concerted action by the brotherhood.

The restoration of the wage scales which were in effect prior to July 1, 1921, is the goal of this organization in its plea for higher wage schedules. Several eastern roads, including the Maine Central, the New York, New Haven & Hartford and the Cleveland, Cincinnati, Chicago & St. Louis, are understood to have already received communications from the brotherhood in regard to its increased wages request. Since July, 1921, the clerical employees have been affected by two rate reductions, one on that date of from 6 to 13 cents an hour, and another on July 1, 1922, of from 3 to 4 cents an hour.

A recent request of the clerks' brotherhood for an increase in wages was denied by the board on the grounds that only extreme conditions would justify an increase in wages within a year after a wage adjustment had been made. If the new petition for wage increases is brought before the Labor Board, it will undoubtedly be at some date after July 1 of this year.

The Order of Railroad Expressmen, representing the 72,000 express employees on railroads all over the country, filed a petition with the Labor Board on April 23, asking an increase in pay of 10 cents an hour. The case has been docketed for hearing as soon as President Harding fills the three vacancies on the board left open by term expirations a few days ago. Requests for wage increases from other railroad organizations are expected at any time. Pleas in all the cases are based upon an alleged increase in the cost of living.

The Passenger Station Is Served by Four Tracks

N. C. & St. L. Rebuilds Terminal in Tennessee

Provides Facilities on New Site for Passenger and Freight Service and Care of Locomotives

THE NASHVILLE, CHATTANOOGA & ST. LOUIS is now operating complete new terminal facilities at Hollow Rock Junction, Tenn., which includes an entirely new freight classification yard and engine terminal and a relocated and enlarged passenger station layout involving the use of the existing station building on the new site. An important feature of the construction project was the platting of a town site adjacent to the terminal, which has been built up with homes for the railroad employees.

The Roundhouse as Seen from the Top of the Coaling Station

Hollow Rock Junction, located 94 miles west of Nashville, is the junction and crossing point of two important divisions of the railroad and, twice daily, passenger trains in both directions on each division meet and exchange passengers, baggage, mail and express. Prior to 1920, this interchange of business had been carried on with inadequate facilities resulting in serious delays both to passenger and freight traffic and early in 1920 a complete revision was decided upon, based on plans requiring the abandonment of every existing facility, including even a two-mile stretch of the main track of each division. It was decided to make Hollow Rock Junction a terminal for freight trains on both divisions and to provide all the necessary facilities not only for the railroad business proper, but for taking care of resident and transient employees; in other words, to build a town where nothing existed but a swamp inhabited by mosquitoes and frogs.

The main feature of the new engine terminal is a 90-ft. turntable serving 29 radial tracks, including 12 tracks over concrete inspection pits, two of which have drop pits; and eight tracks covered by a roundhouse in which there are two drop pits and four inspection pits, the other two stalls being used for a machine shop. The auxiliary facilities include a power house; a pump house with a steam-driven duplex pump and a centrifugal pump driven by a crude oil engine; a mechanical coaling station of 375 tons bin capacity serving two main tracks and an engine track; a mechanical ash handling plant located on the inbound engine track; a mill building equipped with wood working machines; a small blacksmith shop; and an office, locker and wash room, storehouse, oil house and ice house all combined in one building.

Looking West from the Top of the New Coal Chute

Repair tracks were provided adjacent to the engine terminal, so arranged as to admit of constructing a repair shed over them later.

The roundhouse is of heavy frame construction with brick work up to window sill height and the entire wall area above this height composed of metal sash, so that the only exposed wood below the tops of the windows is that in 12-in. by 12-in. pine columns. Each of these rests on a pile surmounted by a reinforced concrete pedestal.

The machine shop located in two stalls of the roundhouse is equipped to handle any kind of repair work. This shop is paved with wood blocks, which were made at the railroad's general shop at Nashville by sawing scrap timber into 8-in. lengths and as this timber varied in size from 2 in. by 4 in. to 10 in. by 12 in., considerable ingenuity was required to lay a floor without objectionable cracks.

The oil and ice house is a brick building with a concrete floor carried on a concrete foundation forming the basement in which oil is stored in steel tanks from which it is drawn to the floor level by self-registering pumps. The walls of the ice-house section of this building are composed of hollow vitrified building tile veneered with brick.

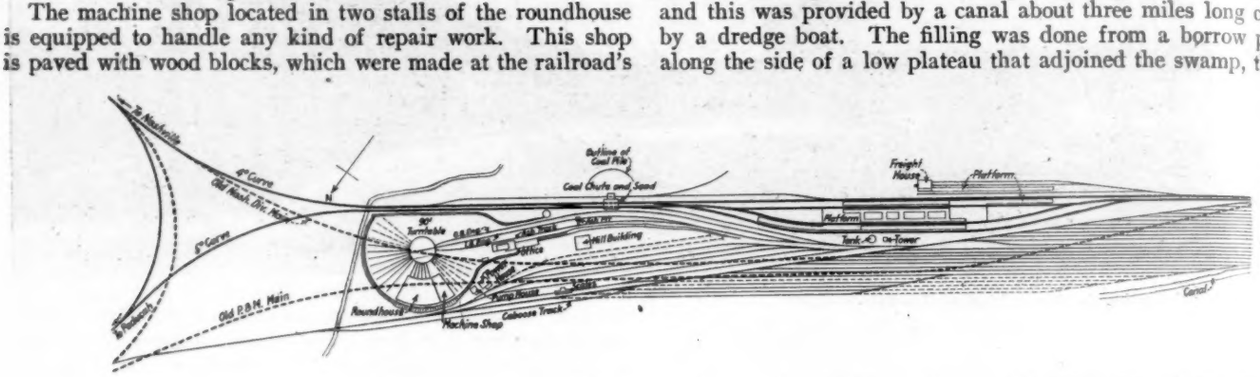
The building which houses storehouse, office and locker room is of stucco construction adjoining the oil house. The stucco was applied with a cement gun on fabricated wire lath having tar paper woven in it stapled direct to the studding. The interior of the building is plastered on ordinary wooden laths. The coal plant is constructed of creosoted timber carried on concrete foundation with a concrete pit 28 ft. deep for the bucket and bucket charging device.

The passenger station layout was designed with a view of facilitating the transfer between the four trains arriving simultaneously. It consists of four parallel tracks, two on each side of the depot, with water columns serving each track so located that the baggage cars of each pair of trains having the heaviest transfer are opposite each other. Concrete platforms with butterfly sheds were provided to facilitate trucking and the transfer is made by ordinary four-wheeled trucks, handled by hand. Plank crossings over the two interior tracks permit trucks to cross them behind the shorter trains, which occupy these tracks and the trucks are thereby forced to follow the route established by these crossings, thus insuring the shortest possible haul and the entire elimination of confusion in handling the transfer.

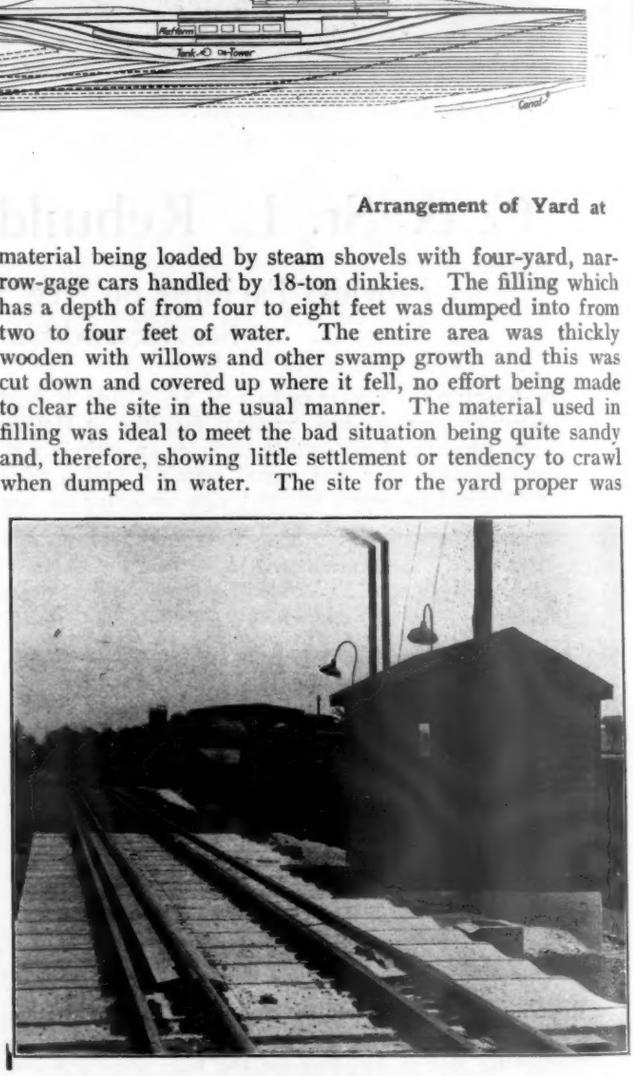
The freight yard was designed with straight leads to facilitate switching over, a hump was placed in one of the leads with a four-section 75-ton scale with automatic weighing and registering device, located at the summit of the hump. The entire yard is well lighted by four banks of flood lights, three of which are supported on 85-ft. steel towers; the fourth one being installed on the top of the coal chute. These lights have proven very satisfactory and have greatly facilitated the handling of business through this point. During the construction of the concrete platforms at the passenger station, which were hurried to completion late in the fall, two of these lights were focused on the work and gave all the light needed for floating and finishing the concrete. The power for the flood lights is furnished by a steam engine operated by a generator in the power house, and this machine, also, provides lights for all the railroad structures, the hotel and the village.

A freight transfer platform provided with a butterfly shed and served by three tracks was built near the passenger station and adjoining the freight house, which was located so as to best serve the town.

To construct railroad facilities in a swamp necessitated extensive filling as well as drainage for the portion not filled and this was provided by a canal about three miles long cut by a dredge boat. The filling was done from a borrow pit along the side of a low plateau that adjoined the swamp, the material being loaded by steam shovels with four-yard, narrow-gage cars handled by 18-ton dinkies. The filling which has a depth of from four to eight feet was dumped into from two to four feet of water. The entire area was thickly wooden with willows and other swamp growth and this was cut down and covered up where it fell, no effort being made to clear the site in the usual manner. The material used in filling was ideal to meet the bad situation being quite sandy and, therefore, showing little settlement or tendency to crawl when dumped in water. The site for the yard proper was graded first, as it was necessary to put the new yard in service before any work at all could be done on the engine terminal.



Arrangement of Yard at

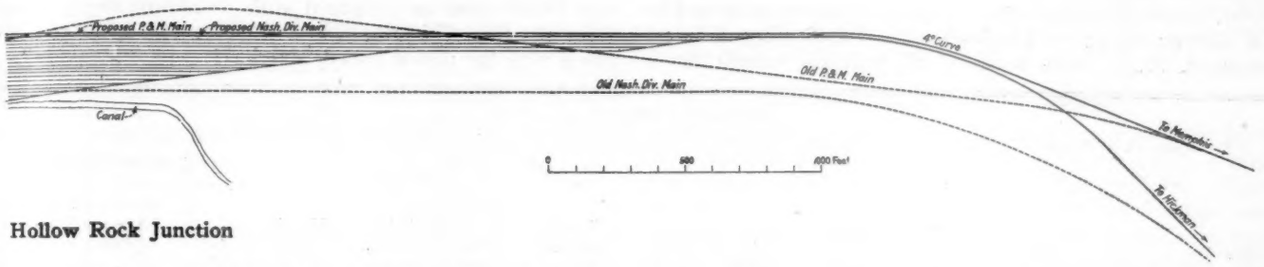


The Scale on the Hump, Roundhouse in the Background

Grading begun June 14, 1920, had progressed far enough to enable track work to be started about the middle of August and by March 1, 1921, 16 of the body tracks were ready for testing prior to putting them into service. The test consisted in moving a coal car loaded with sand to obtain a total weight of 175,000 lb. over each track. The result showed the wisdom of making the test for at many points the

tracks were pushed down into the fill as much as three feet, sand and water spouting up through the cinder ballast and pushing up between the ties. These places were corrected by flooring solidly with old cross ties spliced into the space between the track ties to give additional bearing. The yard was put in service with these old ties in place and the fill consolidated by squeezing the water out of it under traffic, after which the old ties were removed. The old yard was abandoned on April 10, 1921, after which work on the new terminal facilities was started.

Considerable trouble was encountered in building the coal chute because quicksand was encountered unexpectedly at a



Hollow Rock Junction

depth of eight feet in sinking the hopper pit. Two 3-in. jets were used to keep the water out and these were kept in constant operation and proved more satisfactory than any other type of pump since they never lose their priming, but continue to pump even when only partially submerged.

The general plan was made without reference to any existing facilities and since new facilities had to be made ready for service before old ones could be abandoned it was necessary in many cases to connect new tracks temporarily to old ones and to establish new routes through the yard for main tracks. A prearranged program for the work was prepared with such care that it was carried out with practically no change and no delays to traffic occurred at any time. The old passenger station containing a large lunch room had to be moved across eight tracks and placed adjoining the new building and this was done in such a manner that lunches were served for the morning trains in the old location and for the evening trains at the new site and without interruption to the regular trade throughout the day.

The swamp in which the terminal is located is surrounded by a plateau on which the railroad owns a large tract that proved to be a splendid town site. Accordingly, it was subdivided and the lots were sold to employees at cost with the provision that dwellings should be built within six months. The employee was permitted to select his own plans and contractor, but the construction was supervised by the engineering department of the railroad with the result that all buildings are of substantial character and built in a workmanlike manner. The company built a commodious hotel to provide for its transient employees and, also, the general public, graded and metaled all streets and provided an adequate water supply, which was secured by sinking a well 275 ft. to bed rock, from which water is pumped into a 50,000-gal. tank and distributed to every lot by mains in each street.

Conforming to the usual policy of the railroad the entire project was executed with its own forces and equipment and as it was begun at a time of extreme labor shortage and at the end of a long period of construction suspension an adequate force was recruited with difficulty. A camp for boarding and housing the force was built, excellent board and lodging being furnished at $1 per day. The labor turnover during the first two months was very heavy, but by a process of weeding out and selection, a competent and efficient force was organized and the turnover was reduced to practically nothing.

The *Railway Age* is indebted to Hunter McDonald, chief engineer, Nashville, Chattanooga & St. Louis, Nashville, Tenn., for the information presented above.

Block Signal Mileage Statement

THE INTERSTATE COMMERCE COMMISSION has issued its annual bulletin, prepared by the Bureau of Safety, showing the mileage of railroad in the United States operated under the block system on January 1, 1923, together with data concerning the use of the telephone for the transmission of train orders. The total length of railroad in the United States operated under the block system was 103,144 miles; 40,066 miles automatic and 63,078 non-automatic. As compared with the preceding year, there is an increase of 1,004 miles automatic and a decrease of 328 miles manual; net increase 676 miles.

As in former bulletins, the tables show the total miles, single track, double track, etc., operated by the block system, as reported by each road. This results in a considerable duplication and increase of the totals, as, in 25 or more cases, there are considerable sections of line operated jointly by two or more companies and reported by each company.

A separate list is shown, supplementary to table No. 2, from which it appears that color-light signals are in use on 1,559 miles of road. Several hundred miles in this table are made up of the mileage of electric and interurban roads. The principal standard railroads appearing in this list are:

Chesapeake & Ohio, 61 miles; Chicago, Burlington & Quincy, 32 miles; Chicago, Milwaukee & St. Paul, 596 miles; Delaware, Lackawanna & Western, 7 miles; Illinois Central, 24 miles; Southern Pacific, 27 miles.

Position-light signals are in use on the Pennsylvania, 188 miles, and the Lehigh Valley, 3 miles.

The Delaware & Hudson reports electro-gas signals in use on 70 miles of road, 104 miles less than one year before, and an equivalent increase in electric motor signals.

The principal increases and decreases in table No. 1 (total mileage of signals in use) as compared with January 1, 1922, are as follows (miles of road):

	Increase		Decrease,
Name of Road	Automatic	Nonautomatic	nonautomatic
Atchison, Topeka & Santa Fe	296.0	....	89.0
Atlanta & West Point	11.3	....	....
Chesapeake & Ohio	39.6	....	10.0
Chicago, Burlington & Quincy	158.2	....	58.4
Cincinnati, Indianapolis & Western	....	25.1	....
Dayton, Toledo & Chicago (discontinued)	....	....	90.1
Grand Trunk	16.1	....	16.1
Great Northern	195.2	....	....
Illinois Central	9.6	....	....
Lehigh Valley Transit	108.2	....	....
Missouri, Kansas & Texas	56.5	....	....
Northern Pacific	124.9	....	....
Pennsylvania	....	67.1	....

The length of railroad on which the telephone is used for the transmission of train orders aggregates 128,320 miles, which is 5,067 miles more than one year before; at the same time the use of the telegraph for train orders has been discontinued on 3,520 miles of road.

Freight Car Loading

WASHINGTON, D. C.

FREIGHT CAR LOADING continued to increase during the week ended April 14. The total loading was 946,759 cars, over 50,000 cars more than were loaded during the preceding week and an increase of 246,604 cars as compared with the corresponding week of last year. This represents the fifth consecutive week in which the loading has been in excess of that shown in the estimate prepared by the Car Service Division in its report to the American Railway Association, on which was based the program adopted by the railroads at their meeting in New York during the first week of April for handling a record-breaking traffic this year. Increases as compared with the two previous years were shown by all classes of commodities except l.c.l. merchandise and in all districts except the Southwestern. The loading of forest products, 77,313 cars, exceeded all previous records for a week and showed an increase of 22,513 as compared with the corresponding week of last year. There was an increase of 118,185 cars in coal loading as compared with the corresponding week of last year, when the coal strike was in effect. Miscellaneous loading was 75,769 cars greater than the corresponding week of last year and 109,482 cars greater than the corresponding week of 1921.

Reports of 52 railroads showing cars moved as of Wednesday each week show a total of 940,140 cars moved on April 18, which is within 10,000 cars of the record movement made in October, 1920. This included 619,044 loads and 321,096 empties.

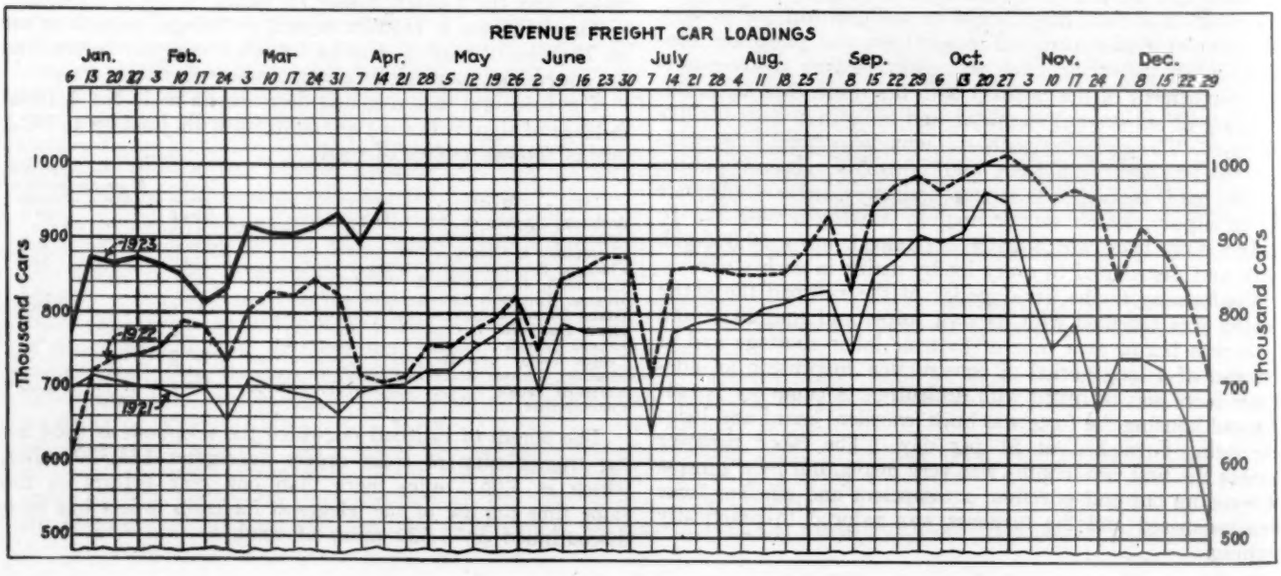
Coincident with this large increase in the loading, there was a considerable decrease in the shortage of freight cars. For the period from April 8 to April 15 the average shortage was 48,584 cars as compared with 58,237 during the previous period. This was also a decrease of 10,749 as compared with the period ended March 31.

REVENUE FREIGHT LOADED

SUMMARY—ALL DISTRICTS, COMPARISON OF TOTALS THIS YEAR, LAST YEAR, TWO YEARS AGO. WEEK ENDED SATURDAY, APRIL 14, 1923

Districts	Year	Grain and grain products	Live stock	Coal	Coke	Forest products	Ore	Mdse. L.C.L.	Miscellaneous	Total revenue freight loaded	Corresponding period	
										1923	1922	1921
Eastern	1923	7,368	3,043	56,013	4,483	6,422	3,907	65,420	95,747	242,403	.....	.....
	1922	6,000	2,698	5,862	1,188	4,510	948	69,232	73,935	.....	164,373	174,110
Allegheny	1923	2,228	2,475	55,778	7,519	3,829	6,752	47,475	86,388	212,444	.....	.....
	1922	1,987	2,141	15,285	4,514	2,796	2,232	51,037	63,048	.....	143,040	140,508
Pocahontas	1923	212	89	21,694	663	1,769	215	6,134	5,245	36,021	.....	.....
	1922	183	52	23,523	264	1,371	20	6,157	4,364	.....	35,934	26,942
Southern	1923	3,807	1,866	23,584	1,285	24,313	1,855	40,073	46,566	143,349	.....	.....
	1922	2,719	2,037	12,669	455	18,764	713	38,064	43,144	.....	118,565	111,336
Northwestern	1923	11,174	9,325	5,772	1,508	22,377	1,739	30,258	36,500	118,653	.....	.....
	1922	7,294	6,295	2,732	1,309	15,024	1,037	29,608	27,760	.....	91,059	88,156
Central Western	1923	10,374	11,284	15,949	437	9,999	3,429	34,864	51,511	137,847	.....	.....
	1922	8,061	9,132	2,716	178	5,844	1,471	34,352	37,690	.....	99,444	103,117
Southwestern	1923	4,166	2,237	3,566	119	8,604	399	14,412	22,539	56,042	.....	.....
	1922	3,414	2,404	1,384	165	6,491	631	14,465	18,786	.....	47,740	57,947
Total Western districts	1923	25,714	22,846	25,287	2,064	40,980	5,567	79,534	110,550	312,542	.....	.....
	1922	18,769	17,831	6,832	1,652	27,359	3,139	78,425	84,236	.....	238,243	249,220
Total, all roads	1923	39,529	30,319	182,356	16,014	77,313	18,296	238,636	344,496	946,759	.....	.....
	1922	29,658	24,759	64,171	8,073	54,800	7,052	242,915	268,727	.....	700,155	.....
	1921	33,554	26,880	134,046	4,386	47,598	5,005	215,633	235,014	.....	.....	702,116
Increase compared	1922	9,671	5,560	118,185	7,941	22,513	11,244	.....	75,769	246,604	.....	.....
Decrease compared	1922	.....	.....	.....	.....	.....	.....	4,279	.....	.....	.....	.....
Increase compared	1921	5,775	3,439	48,310	11,628	29,715	13,291	23,003	109,482	244,643	.....	.....
Decrease compared	1921	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
April 14	1923	39,329	30,319	182,356	16,014	77,313	18,296	238,636	344,496	946,759	700,155	702,116
April 7	1923	39,353	30,883	164,089	16,076	73,957	15,381	234,208	321,820	895,767	706,013	694,881
March 31	1923	41,842	31,726	182,668	15,740	76,124	15,435	235,695	339,495	938,725	821,808	663,171
March 24	1923	39,383	30,349	185,062	14,839	73,384	14,700	232,639	326,680	917,036	837,241	686,567
March 17	1923	39,288	30,633	183,530	15,322	74,152	12,786	229,161	319,414	904,286	815,082	691,396

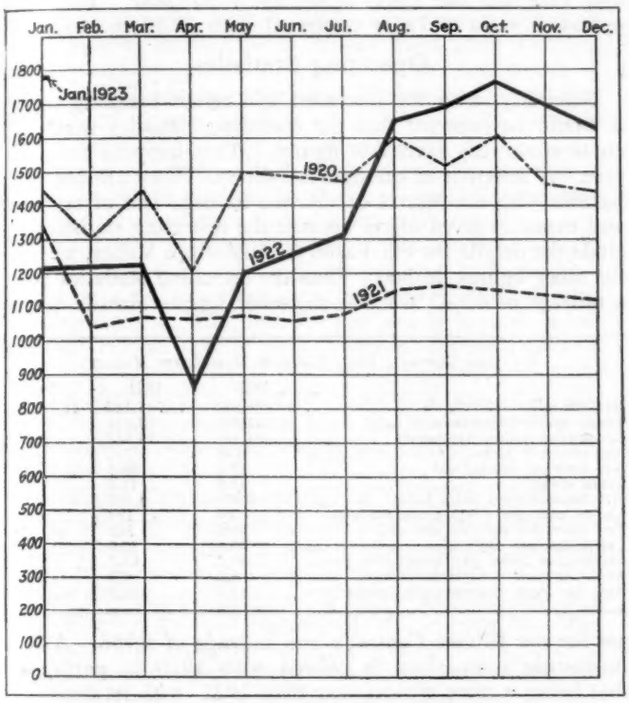
Compiled by the Car Service Division, American Railway Association.



Illinois Central Shows Record Gross and Net

Revenue Ton Miles in 1922 Double 1913 Total—Net Operating Income 50 Per Cent Over Standard Return

CONSIDERING operating and traffic conditions with which the railroads of the country were confronted in 1922, the showing made by the Illinois Central for the year was nothing less than remarkable. The coal strike and the railway shopmen's strike notwithstanding, the Illinois Central carried the largest traffic in its history expressed either in revenue tons or in revenue tons one mile. Reduction in rates—effective on agricultural products, January 1, and on other commodities effective July 1—were such that



Illinois Central Net Ton Miles

there was a decrease of 12.32 per cent in the rate per ton per mile; nevertheless, the freight revenues were markedly in excess of those of any previous year. It would be putting it mildly to say that in spite of the adverse conditions which confronted the railroads generally in 1922, the Illinois Central succeeded handsomely in restoring its earnings to a pre-war basis. Its revenue ton miles were nearly double those of 1913, 1914 or 1915. Its freight revenues, because of the changes in the rate structure which have taken place in the last 10 years, were not quite three times those in each of the three years mentioned. The operating ratio in 1922 was 76.93. In the three years mentioned the ratio averaged approximately 77. Net operating revenues for 1922 were considerably more than double those of the earlier years mentioned, and exceeded the figure for the best previous year, 1917, by nearly 50 per cent. A very safe method for comparing net earnings with those of the pre-war period is to use the standard return as the index. The Illinois Central standard return was $16,282,374. In 1922, the net railway operating income was $25,121,128, slightly more than 50 per cent better than the standard return.

Realizes on Favorable Conditions

This means that the Illinois Central has finally put itself in a position where it has been able to realize on the several favorable conditions which, through the force of circumstances, it has gradually been building up. These conditions, speaking generally, may be divided under three main heads. One is the increased volume of traffic moving north and south to the gulf ports, this increase being both actual and relative. The second is the Illinois Central's extremely able management and the skill it has shown in realizing on this bettered situation. The third is the fact that the Illinois Central has been carrying on for many years an extensive improvement program which has made it a much improved transportation facility. Of course, the three elements are interrelated. They are sufficiently well recognized as to be accepted as axiomatic in any discussion of Illinois Central operations.

Peculiar Conditions in 1922

In 1922, the Illinois Central had certain added special advantages such that it was able to realize on rather than be hurt by the rather unusual conditions which were produced by the combination of the coal strike, the shop strike, and the cuts in rates. It would have been expected, on account of the fact that something like 40 to 45 per cent of the Illinois Central's total tonnage is bituminous coal, the larger part of which is received from union fields, that the road would have been seriously handicapped by the coal strike. As a matter of fact, the tonnage of coal handled in 1922 was practically at normal. It was not as great as in 1920, but it was handsomely in excess of the tonnage handled in 1921. One of the principal reasons for this was unquestionably the shopmen's strike. It happens that the Illinois Central receives a fair volume of coal from the western Kentucky field which is non-union and continued to operate during the coal strike. The shopmen's strike proved of more or less advantage to the road for the reason that the Illinois Central itself was not greatly affected by the strike. The better part of its men remained at work and it was but an extremely short time before conditions had been restored to normal. On the

ILLINOIS CENTRAL TRAFFIC STATISTICS—1914-1922

Year ended Dec. 31	Revenue tons carried	Rev. tons carried one mile	Rev. tons carried one mile per mile of road	Aver. haul	Rev. per ton per mile (cents)	Rev. train load	Tons per car all freight load	Freight revenue	Total operating revenues	Total operating expenses	Operating ratio	Net operating revenue
1913	32,188,892	7,744,028,413	1,625,074	241	0.56	415	23.49	46,130,101	66,030,290	51,218,306	77.57	14,811,984
1914	31,595,884	7,634,506,606	1,600,284	242	0.56	423	23.81	42,588,959	64,339,820	49,401,009	76.78	14,938,810
1915	32,412,182	7,738,180,389	1,623,138	239	0.55	480	23.91	42,681,011	63,804,079	49,019,942	76.83	14,784,138
1916	37,046,832	9,156,870,760	1,920,972	247	0.54	550	24.09	49,437,830	73,740,266	52,843,149	71.66	20,897,117
1917	42,460,189	11,230,069,579	2,356,268	264	0.52	623	26.94	58,443,367	87,144,786	62,339,834	71.54	24,804,952
1918	45,853,934	12,441,047,707	2,603,672	271	0.64	639	28.73	79,271,487	107,320,261	92,252,035	84.10	17,068,226
1919	38,245,714	9,994,435,480	2,085,119	261	0.76	649	27.01	75,831,459	107,886,835	99,262,712	92.01	8,624,123
1920	40,233,079	13,724,232,886	2,859,549	279	0.77	660	30.06	106,178,886	145,154,272	134,181,514	92.44	10,972,758
1921	40,415,089	11,084,093,960	2,309,489	274	0.97	634	28.62	107,092,097	141,127,066	116,852,333	82.80	24,274,733
1922	47,670,424	14,151,817,246	2,957,834	297	0.85	700	28.14	119,849,020	154,860,387	119,129,269	76.93	35,731,118

other hand, the strike on some of its neighbor lines, notably those serving the non-union coal fields, was extremely severe. The natural result of this state of affairs was a sharp expansion in the coal traffic received by the Illinois Central from connections. Its equipment being in good condition and its situation otherwise favorable, it was thus in a position to handle an extremely large traffic. It is, of course, not quite correct to give undue importance to the coal traffic alone. The increase in revenue ton-miles in 1922 as compared with 1921 was 27.68 per cent, so it can be readily understood that it was much more than the coal traffic which produced this favorable condition; the more important element in the situation is that the Illinois Central was able to realize in an unusually handsome manner upon the reviving business conditions with which the country was favored during the latter part of 1922. The situation as regards coal is indicative of the Illinois Central special situation and it is therein that its interest lies.

Diversified Traffic

The Illinois Central operates 4,785 miles of railroad. This mileage does not include the Yazoo & Mississippi Valley, owned by the Illinois Central and operated by it, but the earnings for which are reported separately, nor does it include the Central of Georgia, all of the common and preferred stock of which is owned by the Illinois Central but which road is operated separately. The main stem of the Illinois Central is the practically water grade line from Chicago to New Orleans, double track throughout most of its length except in places where the Yazoo & Mississippi Valley offers the equivalent of a second track line. There are also many stretches of third track. There are various branches, among them being the lines which bring the Illinois Central into St. Louis, Mo.; Birmingham, Ala.; Louisville, Ky.; Indianapolis, etc., as well as the line across the northern end of Illinois and thence across Iowa to Omaha, Sioux City and Sioux Falls. As naturally might be expected from a railroad traversing such a widely separated territory of varying traffic conditions, the road's traffic is unusually diversified. In 1922 the revenue tonnage was divided as follows: Products of agriculture, 15.60 per cent; products of animals, 2.75 per cent; products of mines, 50.79 per cent, the larger portion of which is bituminous coal; products of forests, 11.79 per cent, and manufactures and miscellaneous, 15.4 per cent. The passenger traffic which brought to the road in 1922, 15.5 per cent of its total revenues includes the through service and the rapidly expanding suburban business out of Chicago. The distinguishing feature of the Illinois Central's traffic has been its rapid expansion over a recent term of years as is instanced in no better way than by the detail already noted that the revenue tonnage in 1922 was 50 per cent over that of 1913 and the revenue ton-miles, nearly double. The actual figures show the 1922 revenue tonnage to have been 47,670,424, whereas that in 1913 was 32,188,892, and the 1922 revenue tons one mile, 14,151,000,000 in 1922 as compared with 7,744,000,000 in 1913.

The Marked Improvement Over 1921

The Illinois Central showed perhaps the greatest amount of improvement in traffic and gross and net revenues in 1922 over 1921 of probably any railroad in the country that could rightly be compared with it. The increase in revenue ton-miles was actually 27.68 per cent. The increase in tonnage was evident in practically all of the classes of commodities carried except wheat. There were, particularly, substantial increases in coal, building materials, forest products, asphaltum and refined petroleum and its products. The increased traffic was handled at lower rates than that in 1921. There was a decrease in the revenue per ton per mile of 12.32 per cent, the average receipts per ton-mile in 1922 being 0.85 cents and those in 1921, 0.97 cents. The increase in the volume of traffic was such, however, as to compensate for the decreased receipts per ton-mile to the extent that the freight revenues were 11.91 per cent in excess of those for 1921. The freight revenues were actually $113,970,423, an increase of $10,987,388 over 1921. Total revenues were $154,860,387, the greatest in the company's history and comparing with $141,127,066 in 1921, an increase of $13,733,322. There was also an increase in operating expenses. This was due principally, of course, to the increased volume of traffic. The actual figures show that the operating expenses in 1922 were $119,129,269, comparing with $116,852,333 in 1921, an increase of $2,276,936 or 1.95 per cent. The most satisfying increase was in net railway operating income which, as has been noted, was good enough to be about 50 per cent better than the standard return based on the average for the three years ended June 30, 1917. The 1922 net operating income of $25,121,128 compared with $17,542,228 in 1921 and exceeded the 1921 figure by $7,578,900. The 1922 operating ratio of 76.93 compared with 82.80 in 1921.

Operating Statistics

Naturally, with the increased and record-breaking traffic, it would be expected that the operating statistics would include some very favorable figures. This happens to be the case. A selection of the figures follows. They are not comparable with the figures of revenue tonnage and of revenues and expenses given above because the operating statistics include the details for the Yazoo & Mississippi Valley, whereas the other figures do not. Thus the operating statistics cover a mileage of 6,136, whereas the other figures already quoted are for the Illinois Central's own mileage of 4,788. A very interesting comparison is offered with 1920 in particular, that being a more typical year than 1921, with its depressed traffic. It will be noted, in particular, that there was a substantial increase in the net tons per train from 743 in 1920 to 761 in 1922, these figures being of interest because they have two elements of favorable character, one being the relatively high figure in the first place and the satisfactory increase besides. The net tons per train include both revenue and non-revenue freight. It would be well to refer also to the revenue trainload figures of the Illinois Central itself. The figures appear in another table and show for 1922 700 tons, comparing with 634 in 1921 or 660 in 1920 and showing a progressive improvement in each year since the first figure given of 415 in 1913. It is not always wise to compare operating statistics for one year with the year immediately preceding; it is best to take a term of years to secure a more adequate picture. There will be few cases in which the figures for a term of years will show a more satisfactory condition of operating efficiency than is the case with the Illinois Central.

The operating statistics show also an increase from 8,070 net ton-miles per train hour in 1920 to 8,611 in 1922. The net tons per loaded car, 29.7 in 1920, were better than those in 1922—28.0, due unquestionably to the larger proportion of coal in the total tonnage in the former year. The 1922 figures of 707 net ton-miles per car day, 38.7 car miles per day, 74.7 locomotive miles per locomotive day and the low figure of but 145 lb. of coal per 1,000 gross ton-miles are

ILLINOIS CENTRAL, INC., YAZOO & MISSISSIPPI VALLEY

	1920	1921	1922
Net ton-miles—thousands	17,488,997	13,745,122	16,752,921
Train miles—thousands	23,548	19,213	22,001
Locomotive miles—thousands	24,147	19,742	22,739
Net tons per train	743	715	761
Net tons per loaded car	29.7	28.5	28.0
Train speed	10.9	11.8	11.3
Net ton-miles per train hour	8,070	8,455	8,611
Lb. of coal per 1,000 gross ton-miles	166	144	145
Net ton-miles per car per day	805	588	707
Car miles per day	40.9	33.0	38.7
Locomotive miles per locomotive day	80.5	65.7	74.7
Ave. per cent unserviceable cars	5.3	8.9	8.4
Ave. per cent unserviceable locomotives	13.1	11.9	10.9

sufficiently better than those of most other roads as to indicate very favorable operating conditions, efficient management or both. There are many limitations in utilizing operating statistics to advantage in analyzing the operations of a railroad from the outside. Various observers are endeavoring to use them for this purpose but only gradually. One trouble is, of course, a certain lack of understanding as to what the figures mean and a hesitancy to apply them without more complete knowledge of the underlying conditions to which they relate. There is also the detail that the figures vary in close relationship with the volume of traffic—good when the traffic is heavy, less good when it is light. This circumstance is evident in the Illinois Central figures, but taken as a whole, I.C. operating statistics paint a picture which compares very favorably with other roads.

There is reproduced with this article the usual chart of net ton-miles by months. The figures again include the Y. & M. V. They show that the best month in 1920 was August but that the August, 1920 total was exceeded in 1922 in each of the months of August, September, October, November and December, October being the best month of the five. It is interesting to observe further that the net ton-miles in January were much in excess of those for October. It is too early in the year to surmise what the year as a whole may bring forth. It is at least safe to say that if business conditions continue good, the Illinois Central may be expected to show some rather spectacular results.

For equipment maintenance conditions, we now use the per cent of bad order cars and the per cent of locomotives held for repairs requiring over 24 hours. The Illinois Central on April 1, 1923, had 6.4 per cent of its cars in bad order and 15.0 per cent of its locomotives unserviceable. It is of interest that on July 1, 1922, when the shopmen's strike began, the unserviceable locomotive per cent was 18.5. On July 15, the figure had become 12.4, and on August 1, 13.9. This indicates in what small degree the Illinois Central was hurt by the strike.

The Illinois Central annual report for 1922 contains an imposing array of details about the addition and betterment work completed during the year to improve the operating efficiency of the system. There are included notably various third and second track projects. Progress at Markham yard between Harvey, Ill., and Homewood, Ill., is reported. During the year 338 company sidings covering 74.40 miles of track and 110 industrial sidings were built or extended. The largest project under way just now is, of course, the electrification at Chicago, to pay for which the company has recently issued its $10,000,000 preferred stock. During the year the company added 5,435 freight cars and retired 8,488, a net decrease of 3,053 cars. It added 8 new locomotives and retired 19, a decrease of nine, but this resulted in an increase in tractive effort of 162,096 lb. The company, however, placed large orders for cars and locomotives not delivered by the close of the year and has since placed additional orders.

Dividend Record Dates Back to 1863

The common stock of the Illinois Central totals $109,504,167 and the preferred, $10,721,300, a total of $120,225,467. The long term debt now totals $273,014,045. Net after charges in 1922 was $16,054,890 comparing with $9,656,275, an increase of $6,398,615. The 7 per cent dividends total $7,658,009. The preferred received in 1922, 4.1 per cent—$441,835—and the rate is 6 per cent. It is of interest that as of December 31, 1922, the company had a corporate surplus of $53,529,767, an increase of $17,275,423 over the figure as of December 31, 1921. The dividends on the common stock have a continuous record back to 1863, the rate during this period having varied between 4 and 11 per cent. The Illinois Central's record and apparent future prospects single it out as a somewhat unusual property.

Hearing on Lehigh Valley Efficiency and Economy

WASHINGTON, D. C.

HEARINGS in the Interstate Commerce Commission's investigation into the economy and efficiency of railroad management (during a period which included both a coal strike and a railroad shopmen's strike) were begun on April 23 before Division 5, Commissioners Aitchison, Cox, Eastman and Potter. The first hearing, on Monday, Tuesday and Wednesday, was devoted to the Lehigh Valley, for the reason, it is understood, that the commission had already gathered a large amount of data regarding its performance since July 1. After three days had been devoted to testimony by commission witnesses as to conditions on the line following the shop strike, the Lehigh Valley showed that it had fully recovered from its difficulties and is now meeting all traffic demands and handling the largest business in its history.

Commissioner Aitchison said that other carriers would be brought into the investigation later. He explained that the inquiry naturally divided itself into three parts, dealing with the expenditures, what had been accomplished by the expenditures and whether, in the circumstances, the results indicated efficiency and economy. In the first stage of the proceeding, he said, facts as to the first two points were desired rather than conclusions as to the third point. Examiner Curry then announced that testimony would first be given by witnesses for the commission as to the amount and cost of maintenance of equipment and the transportation service performed and that the carrier would be given an opportunity to give testimony as to whether the facts represented economy and efficiency.

C. A. Rice, statistical analyst of the commission's Bureau of Service, the first witness, put in evidence voluminous exhibits compiled as the result of a special investigation conducted by that bureau with some assistance from the Bureau of Safety and the Bureau of Locomotive Inspection, covering the period July 1, 1922, to February 28, 1923, with comparisons with the two preceding corresponding periods. These covered such points as traffic handled, freight train performance and delays at terminals, cost of locomotive performance, maintenance of equipment expenditures, unserviceable equipment, engines handled per man hour, etc. While the traffic handled was less than during either of the previous periods it was shown that this was in part attributable to the lack of coal tonnage during July, August and the first part of September and that after the mines were opened the loading of anthracite greatly exceeded that of the periods ending in 1922 and 1921. The operating ratio for the period was 102 as compared with 82.3 for the period ending in 1922 and 100.7 for the period ending in 1921. The maintenance of equipment expenditures were $15,163,000, as compared with $13,506,000 and $17,852,000.

When E. H. Boles, vice-president and general counsel of the Lehigh Valley, asked if the witness had taken into consideration the effect of sabotage, such as placing ashes in journal boxes, an objection was made by Henry T. Hunt, former member of the Railroad Labor Board, who said he appeared as counsel for the Railway Employees' Department of the American Federation of Labor. The objection was overruled by Commissioner Aitchison and the witness answered that he had merely compiled the statistics.

F. C. Smith, chief inspector of the Bureau of Service, testified as to reports of agents of the bureau that had visited the various terminal stations and checked the movement of empty and loaded cars for delays. He was followed by inspectors of the locomotive bureau who testified regarding the condition of locomotives, accidents, etc. One of the inspectors put in the record copies of sworn reports made by

the railroad to the commission as to monthly and annual inspections of locomotives and in the case of six engines testified that the commission's inspectors had found on the day following the date of the railroad reports defects which under the regulations should have kept the engines out of service and which had not been reported and which indicated that they had existed for some time. These involved the condition of staybolts, boiler tubes, water glasses, etc.

Another inspector testified to having ordered two locomotives out of service twice because the railroad had not complied with the first order and that defects had not been remedied at the time of the second inspection. In connection with one character of defect reports, Mr. Boles asked the witness if, in his judgment, the locomotives were not safe for use in spite of the fact that there was a violation of the regulations, and also whether defects of this character had not been overlooked on many previous occasions in the discretion of the inspector. Commissioner Aitchison asked if counsel took the position that the Lehigh Valley was allowed a discretion to go behind the rules. Mr. Boles said he recognized that the rules might have been violated and that a court would so hold, but that they had in the past been applied with a great deal of discretion on the part of the inspectors and that the inspection had taken on an entirely different character in January and February, when minor defects were reported that at other times would not have been. In January and February, he said, the inspectors reported many items that they knew did not represent unsafe conditions. Mr. Aitchison said that that statement could not stand in the record as evidence.

Another witness gave testimony as to the number of locomotive failures, mentioning two engines which failed 19 times in three months. He said that on the Wyoming division one month last winter the average number of serviceable locomotives out of 102 assigned was 30 and that 43 locomotives failed during the month. He also showed that during October, November and December, 1922, 282 crews were tied up under the 16-hour law as compared with 15 in the corresponding months of the year before and 27 in 1920. When a witness referred to the large number of stoker failures Mr. Boles asked if he had noticed that many of them were due to bolts and foreign matter having been placed in the mechanism as sabotage. He replied that he had not identified the causes, although he had referred to this as the "most rigorous investigation" he had ever made.

When the commission witnesses had concluded and Commissioner Potter said that the Lehigh Valley would be allowed to make its own case in its own way Mr. Boles said he had just one witness to offer at this time. J. N. Haines, superintendent of transportation, took the stand and said that the testimony that had been offered showed the difficulties that the road had experienced but that despite the serious effects of sabotage and other results of the strike and unusually severe weather the Lehigh Valley has now entirely recovered and is handling promptly the greatest traffic in its history for this time of year. "Whatever difficulties we have had," he said, "we have come out on top and are ready for business in a normal way and soliciting more. There is no congestion at any point on our line, no embargoes restricting the movement of business, and we are furnishing all cars required. Our average daily movement is in excess of 10,000 loaded cars and 4,000 empty cars, which is above normal for April. Between September 11, when the mines opened, and March 31, the Lehigh Valley handled approximately a million and a half tons more anthracite coal than ever before in a similar period. Because the coal movement was delayed by the mine strike our burden was greater than usual but our efforts were concentrated on anthracite because that seemed to be the prime duty of the Lehigh Valley. The railroad is prepared to handle a considerably greater traffic as it develops. Our locomotive situation is such that we are able to meet all requirements in ample fashion. Excellent progress is being made in the reduction of bad order engines and we have ordered 40 additional freight engines to handle the demand expected next fall."

When Mr. Haines said that virtually all the difficulties experienced by the road were caused by the shop strike, sabotage and severe weather Mr. Hunt asked what he meant by sabotage. He replied that he meant wilful and malicious interference with the operation of trains and damage to equipment. Mr. Hunt then asked how he proved the malice and intent and whether everything was called sabotage that could speculatively be so considered. "When a man comes along and slits an air hose or places cast iron parts in a stoker runway we consider that malicious," replied Mr. Haines. Mr. Boles added that he expected to put in evidence enough specific cases to enable Mr. Hunt to determine for himself whether they were intentional. He said that water tanks had been dynamited and ashes and other matter put in journal boxes.

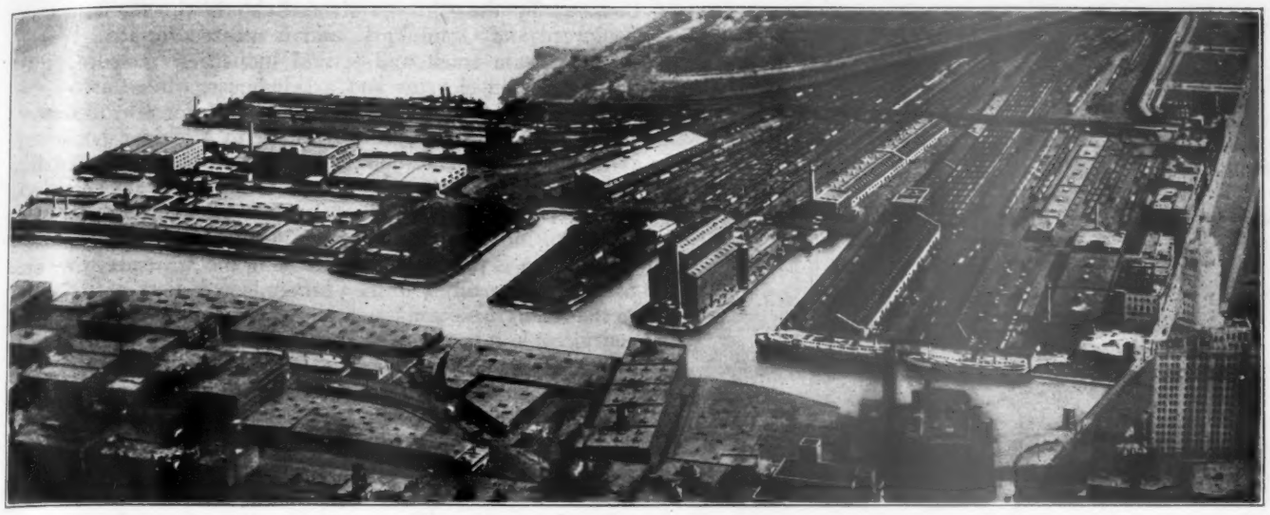
Commissioner Potter then asked whether the road proposed to show why it had not overcome its difficulties sooner. Mr. Boles replied that he expected to explain the causes. "We are like a man who has had typhoid fever," he said. "We have been through a disease and we are a better railroad for it and time will show it." There was some discussion as to when the hearing should be resumed. The examiners were willing to postpone the cross-examination until a later hearing and Mr. Boles said he would be willing to proceed after the answers to the commission's questionnaire had been filed by the railroads, after May 25. Commissioner Potter said the commission was anxious to proceed with the inquiry and called on Mr. Hunt for his views.

"It is the position of the shop crafts and the Farmers' National Council, which I also represent," said Mr. Hunt, "that it is a matter of the greatest importance to determine whether the railroad executives have handled the situation with economy and efficiency and whether conditions before July 1 were provocative of disturbed labor conditions and such an expensive episode as occurred on July 1. We hope that the Lehigh Valley will proceed with its defense and that we be permitted to show the events leading up to July 1 and what sound management would have done. We do not believe that the history of the world began with last July but that we should begin perhaps with the termination of federal control."

Mr. Boles retorted that "the Lehigh Valley has no defense to make." "We have an explanation to offer," he declared "but we think the shop crafts have the defense. It was a costly experience and as to whether the cost was justified may take several years to determine but as to how the cost came about we are prepared to explain."

Mr. Potter said the commission had not intended to go into any abstract question of the relations between employer and employee or to invade the field of the Labor Board but that it is its province to inform itself as to whether, all things considered, a management was efficient and economical. There might be some question, he said as to how far the commission would permit Mr. Hunt to go. He therefore suggested an adjournment for two weeks, or until May 9, so that the commission might consider whether it wishes to enlarge the scope of the inquiry that far and whether it should proceed with the Lehigh Valley or take up the case of some other carrier.

THE TOURIST TRAFFIC to the national parks in Canada during 1922 left in the Dominion, according to an estimate of the commissioner of parks, about $20,000,000. Counting as expense only the money paid out by the government in maintaining the parks, the commissioner calculates the profit of his department at 2,000 per cent per annum.



The South Water Street Terminal as it Looks Today

Another Plan for a Terminal at Chicago

Provision Is Made for a New "Loop District" in Suggested Air-Right Development North of Randolph Street

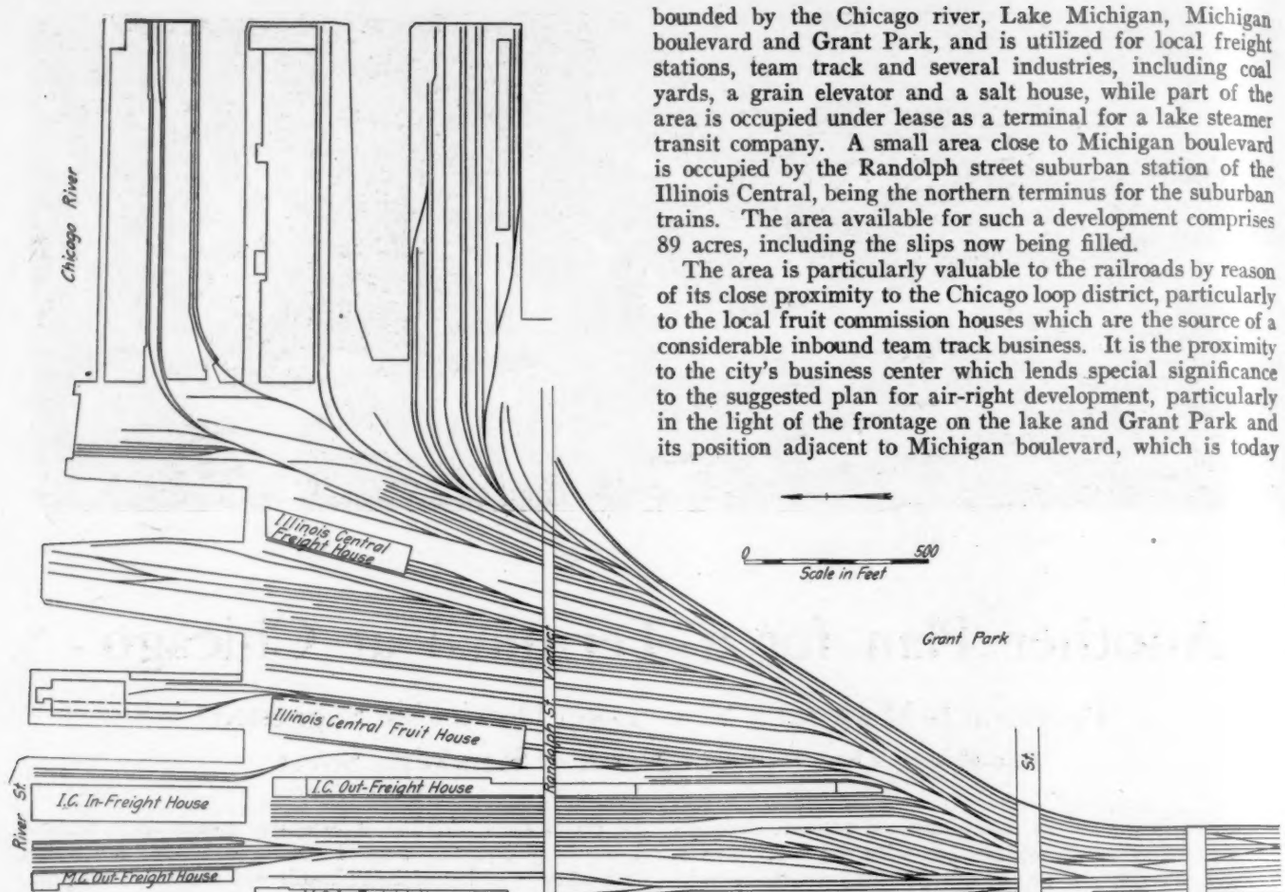
FURTHER IDEAS on the possibilities of intensive development of railroad facilities are to be obtained from a plan covering the improvement of the property belonging to the Illinois Central, in what is known as the South Water street terminal at Chicago. This contemplates a reconstruction of the existing railway terminals in this area, coupled with an intensive development of the air-rights along the lines carried out so successfully in connection with the Grand Central Terminal improvements in New York City. The plan is intended merely as a general survey of the possibilities, capable of extensive modification without in any way departing from the basic idea. No action has been taken by either of the railroads with respect to the plan, but it is of particular interest as offering one means for obtaining an income from railway property which will in some measure compensate for the large non-revenue producing improvements to which the railroads are committed in the form of an enormous passenger terminal and electrification project in that city.

The area in question covers approximately 100 acres

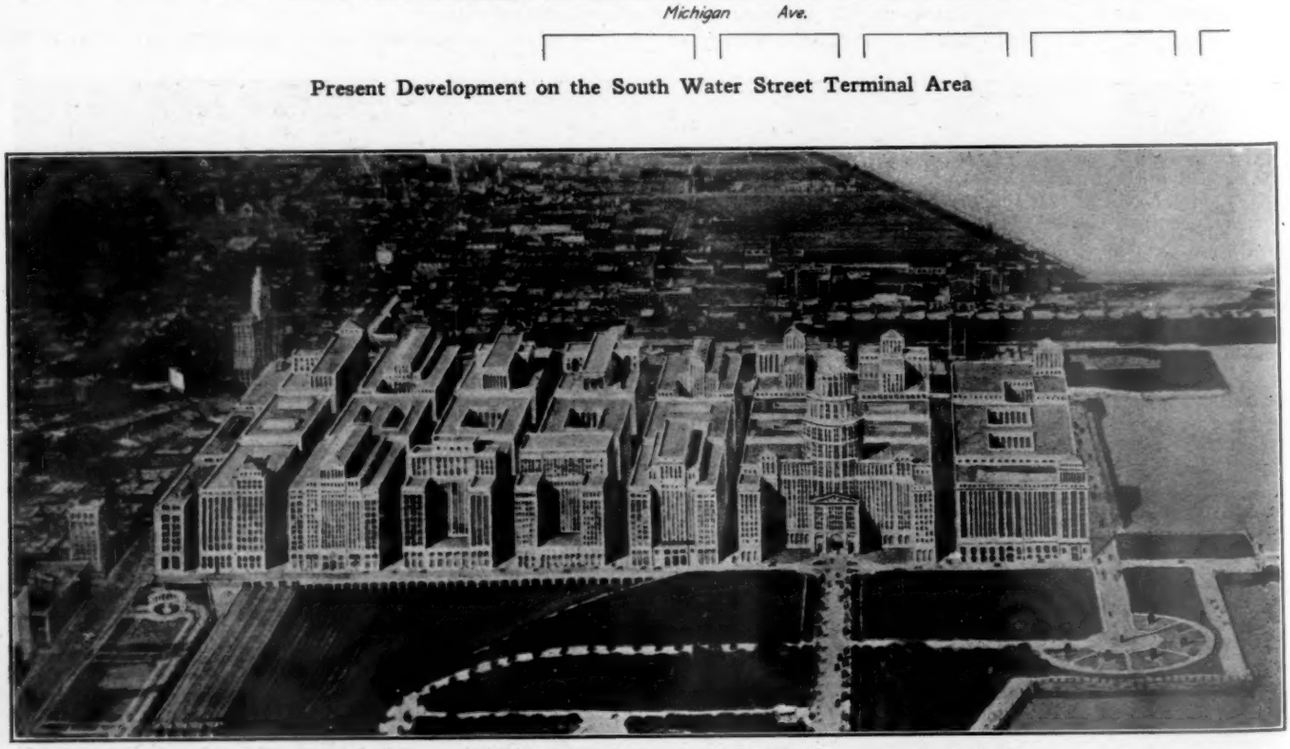
A View of the Proposed Improvement as Seen from the North Chicago River in the Foreground

bounded by the Chicago river, Lake Michigan, Michigan boulevard and Grant Park, and is utilized for local freight stations, team track and several industries, including coal yards, a grain elevator and a salt house, while part of the area is occupied under lease as a terminal for a lake steamer transit company. A small area close to Michigan boulevard is occupied by the Randolph street suburban station of the Illinois Central, being the northern terminus for the suburban trains. The area available for such a development comprises 89 acres, including the slips now being filled.

The area is particularly valuable to the railroads by reason of its close proximity to the Chicago loop district, particularly to the local fruit commission houses which are the source of a considerable inbound team track business. It is the proximity to the city's business center which lends special significance to the suggested plan for air-right development, particularly in the light of the frontage on the lake and Grant Park and its position adjacent to Michigan boulevard, which is today



Present Development on the South Water Street Terminal Area



Suggested Air Right Development as Viewed from the South

Chicago's leading street for high-class hotels and office buildings. The so-called loop district of the city has long been overgrown and the gradual expansion which is now taking place has been almost entirely northward along Michigan boulevard in the portion of this thoroughfare flanking the railroad terminal area in question. It is, therefore, contended that the development of the area above the railroad terminal, with suitable subdivision by east and west and north and south streets, will afford opportunity for a further expansion of Chicago's business district in the very direction in which the expansion is now taking place.

The architectural treatment suggested, as illustrated in the accompanying wash drawings, superimposed on airplane views of the site, is one that is in keeping with high grade occupancy and the natural attractiveness of the site, keeping in mind its relation to the eventual development of Grant Park. Particular effort has been made to avoid a deadly uniformity in the treatment without the use of heavy overhanging cornices or other extraneous details or ornamentations.

The development of air-rights over railway terminals implies electrification, as well as a two-level street arrangement. Provision for the former has already been definitely made in the contract ordinance between the city of Chicago and the Illinois Central, under which all train movements within the area in question must be conducted with electric power. The city also is definitely committed to the two-level street plan in this vicinity, part of which has already been completed in the form of the so-called Michigan boulevard improvement providing for a lower level street for trucking purposes.

The proposed development of the terminal area for railway uses provides for a much more intensive utilization of the available area. Tentative layouts provide track space for approximately 2,000 cars, suitably subdivided between team tracks, house tracks, industries, storage, etc. Provision is also made for considerable enlargement of the suburban station facilities in the light of estimated future growth in the suburban traffic. This has increased from 38 trains per day in 1888 to 374 trains in 1923.

Any plan for improvements of as elaborate a nature as those contemplated in the proposed plan necessarily implies a degree of permanence such as to preclude any radical reconstruction within any limited period of time. This necessarily imposes a development of the railway facilities of such a nature as to be capable of considerable modification to meet changing requirements and advancement of the art in railway transportation. Accordingly the report includes a series of studies illustrating how the railway facilities may be modified under the proposed plan without requiring any alterations of the air-right superstructure. The initial development of the railway facilities may be carried out according to either single level or double level plans, it being the idea to place the level of the street serving the air-right development at a sufficient elevation to provide for two levels below, namely, an intermediate level for street vehicles serving the freight terminal area and a lower level for the railway tracks. The plan also provides for a full development of the water frontage for rail-lake trans-shipment.

FOURTEEN THOUSAND is the estimated number of the persons killed in automobile accidents in this country in the year 1922, as reported by the International Bureau of Casualty and Surety Underwriters. This is calculated as equal to 12.9 per hundred thousand of population, and 1,600 more than the total in 1921. The estimates are based partly on statistics supplied by the health officers of 60 cities having each a population of 25,000 or more. The same statement says that the automobile was responsible for two-thirds of all deaths caused by vehicles.

National Industrial Traffic League Meets at Dallas

THE annual meeting of the National Industrial Traffic League was held at Dallas, Tex., on April 18 and 19. The first report presented was that of the committee on railroad consolidations, which advocated the permitting of consolidations when brought about in a natural way and in a manner that would not lessen competition. Following the discussion of this report, a resolution was passed to the effect that the National Industrial Traffic League participate officially in the hearings before the Interstate Commerce Commission (I. C. C. Docket No. 12964) with reference to the general consolidation plan for the railroads of the country, for the purpose of insisting that any plan that may be adopted shall preserve carrier competition between existing railroad systems and for the further purpose of presenting to the commission the position heretofore taken by the league with reference to consolidations and the reasons therefore. The executive secretary and the League's counsel were delegated to present the League's views to the commission.

The executive committee reported that the Calder resolution, which directs the director general to pay meritorious loss and damage claims which had been seasonably filed regardless of the interpretation of Section 206-a of the Transportation Act, does not create any board or other machinery to determine what are and what are not meritorious claims but leaves the question to be determined by the director general, and if he should decide that the claims are not meritorious there is no recourse from his decision. If he should decide that some claims are meritorious and pay them and that other claims are not meritorious and decline to pay them, he would subject himself to the charge that he was discriminating as between claimants. It was believed that since the director general was opposed to the enactment of this joint resolution its passage would not be effective and the committee accordingly struck the subject from its docket. This action of the executive committee was approved.

In considering the carrier's plans to increase carload minima generally, the executive committee recommended that the league express its sympathy with the plans to establish carload minima as high as consistent with commercial requirements and with due regard to safe carriage of the lading, but that the league oppose any policy that views the minima to be fixed without reference to commercial needs or to minima that are established purely with respect to car capacity. This recommendation was adopted.

In considering the proposed investigation by the Interstate Commerce Commission of the sur-charge on passengers traveling in sleeping or parlor cars and of the rates of the Pullman Company, the executive committee recalled that the League resolved to take no action with respect to having the sur-charge removed from Pullman fares in January, 1922, and that the League opposed at the meeting in New York in November, 1922, bills that were pending in Congress proposing to repeal the Pullman sur-charge. The committee referred the subject to the Passenger Traffic Committee with instructions to watch the proceedings and be prepared to make recommendations to the League and instructed the chairman of the Passenger Traffic Committee and the executive secretary to keep in touch with the counsel for the League and keep the executive committee informed of the progress of the investigation. This report was adopted.

The Committee on Transportation Instrumentalities and Car Service reported that consideration had been given to the plan for the pooling of railway equipment proposed by the National Association of Owners of Railroad Securities, commonly known as the Warfield Car Pooling plan. The plan was considered at a meeting on March 13 at Chicago

and had been before the committee in the form of pamphlets and circulars. At the forenoon session, M. W. Harrison, vice-president and D. B. Huntress, chairman of the Public Relation's Committee of the National Association of Owners of Railroad Securities, were present and Mr. Harrison spoke on the necessity for and the advantages of the correlation of transportation service, dealing principally with the financial side rather than with the details of the operation of the proposed plan. G. D. Conn, chairman of the Public Relation's Committee and J. J. Pelley, representative of the Car Service division of the American Railway Association at Chicago, were present at the afternoon session and discussed the operations of the Car Service division and the railroad situation generally for 1922 and the months of January and February, 1923, in which it was shown that notwithstanding the handicaps the carriers were obligated to face during 1922, incident to the strike of coal miners and the strike of railway shopmen, followed by the most severe weather that New England and New York had experienced for many years, the carriers have handled the largest traffic they have handled for the corresponding period in previous years. In view of the decreasing car shortage and the fact that the National Association of Owners of Railroad Securities was preparing a reply to the report of the committee of the American Railway Association analyzing the proposed car pooling plan and the intimation made by Mr. Conn that the Car Service division is considering a revision of some of the car service rules and is developing its plan for territorial committees with district managers, it was the unanimous opinion of the members of the committee that a definite recommendation should be deferred awaiting further developments and information. This was approved by the League.

The report of the committee on Car Demurrage and Storage was amended by the executive committee and adopted by the League with a minority report offered by C. D. Childs of Omaha, as a substitute for one section of the report as presented the executive committee. Changes were advocated in demurrage rule 1-b-3, 1-b-4, 2-a-2, 2-b-3, 2-b, 2-c, 3-a, 3-d, 3-e, 3-f, 4-e-1, 4-e-2, 6-b, 6-b-1, rule 8 preamble, 8-e, 9-e and storage rule 1 preamble.

The Freight Claim committee reported a conference with the Freight Claim division of the American Railway Association on January 19, 1923, at which both committees agreed that all claims for concealed loss and damage to important shipments will be presented and adjustment considered on a basis not exceeding 50 per cent as the rail carriers' proportion of the cost of the merchandise to claimants, providing reimbursement has not been or cannot be obtained by claimants through insurance or otherwise. After having taken the matter up with the Trunk line counsel, further developments are awaited. The allowance of trade and cash discounts to railroad companies in settlement of loss and damage claims was discussed and the executive committee recommended that the subject be dropped and that it would be unwise for the League to agree to any basis for settlement of claims of this character but that each claim should be settled on its merits. The report of the executive committee was adopted.

The Legislative committee made an extensive report on Thursday condemning proposals that are being made that the market value of railroad securities be used as the basis for determining the level of freight rates. The executive committee recommended that the report of the Legislative committee be received and the committee directed to make a further investigation and prepare a more definite recommendation at the annual meeting in November and that the committee's report be circulated to members a sufficient time in advance of the meeting to give them time to give it careful consideration. The recommendation of the executive committee was adopted.

The League unanimously adopted a resolution to oppose any change in the act to regulate commerce that has for its purpose the revoking of the suspension clause. The League voted that express rates should be made on a basis that will secure a proper return for the service performed irrespective of any contracts between express companies and the railroad for the division of the gross express revenue; that the commission should consider the increases made in Ex Parte 74, in determining the adequacy of railroad revenue as a whole; that the commission should determine whether its decision regarding express rates in 1920 should be revised because of the uniform express contract or because of the fundamental basis which it established in the first instance; that if the commission should find the fundamental basis to be fair and that the uniform contract improperly distributes the amount for division among the rail carriers, the contract should be revised; that if the commission should find, for instance, that the railroads as a whole are receiving more than they are entitled to under the 1920 Express decision, a reduction should be made in express revenue as a whole upon lines found proper by the commission; that the commission should carefully recheck the express structure with a view to ironing out any irregularities which may be found and that the block system of stating the rates be retained.

The report of the Committee on Highway Transportation was referred back to the Highway Committee for definite recommendations upon the suggestion of the executive committee. The report of the Passenger Traffic committee and the recommendation that the League should not interest itself in any of the proposed meetings contemplated in connection with the mileage book subject, was adopted.

Other reports adopted were that of the Committee on Rate Reduction and Tariff, that of the special Committee on Claims Prevention and that of the special Committee on Embargo Rules and Regulations.

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Hadn't We Better Get Rid of the Pet We Have Before Buying Another?

General News Department

The **National Association of Purchasing Agents** will hold its eighth annual convention at the Hotel Winton, Cleveland, Ohio, on May 15 to 18.

Erie Fined for Violation of Women's Hours of Work Law

At Susquehanna, Pa., on April 21, the Erie Railroad was fined $25 for violation of the law regulating hours of work for women. The prosecution was in connection with the employees of the railroad company's restaurant.

Wage Increases in the East

The Boston & Maine has made an advance in the wages, said to be 3 cents an hour, of about 4,000 trackmen. The Pennsylvania has made advances ranging from 1½ cents to 3½ cents to common laborers in the Northwestern region and certain other sections; but announces that no general increase has been made. The Wheeling & Lake Erie has made advances to large numbers of shopmen, amounting to about 7 cents an hour. Most of these shopmen will now enjoy rates about equal to those enforced before the Labor Board made its reduction.

Wage Increases in the West

Illinois Central has granted increases in pay averaging two cents an hour to the mechanics, helpers and apprentices in the company's shops. The increased rates are retroactive to April 1. Carmen assigned to passenger and freight car truck work are not included in the increase. The Cleveland, Cincinnati, Chicago & St. Louis has announced its intention of increasing the wages of its maintenance of way employees, but has not yet made public the amount of the advance. Section foremen, section laborers and mechanics are included in the increase.

Clerks Seek Increased Wages

The Brotherhood of Railway and Steamship Clerks, etc., has made formal demand for an increase in wages on the Maine Central, the New York, New Haven & Hartford, and the Cleveland, Cincinnati, Chicago & St. Louis; and it is said that the intention is to make demands generally throughout the country. What they want is a restoration of the wage rates of May 1, 1920, the highest ever paid. Some railroad officers think that the membership of this brotherhood has shrunk during the last year or two; and that it is a matter of doubt whether the leaders will have adequate support in their proposed campaign.

Anderson Tells of Transportation Institute

The National Transportation Institute and the part it should play in the solution of the current railway problems were the subject of an address before the Western Railway Club at the Auditorium Hotel, Chicago, on the evening of April 16, by Congressman Sidney Anderson, chairman of the Congressional Joint Committee of Agricultural Inquiry. Congressman Anderson presented a general survey of the current transportation problems, pointing briefly to the various proposals which have been advanced for overcoming them. The study of these, in his opinion, points to the need of basic information concerning transportation matters which will not only be authoritative but will also have the stamp of fairness and impartiality so definitely established as to be received with confidence by everyone. This is what he believes can be accomplished by the National Transportation Institute, which is being organized on a basis that should disarm all criticism. He closed with the plea for cooperation by the railroads in the work that the institute proposes to do.

A Prize of $200

A new through train is announced by the Southern Railway, to begin running on April 29, between New York and New Orleans, traveling over the Pennsylvania north of Washington, and south of Atlanta over the West Point route and the Louisville & Nashville. The times are expected to be as follows: Leave New York 3:35 p. m., arrive at New Orleans on the second morning at 7:20; leave New Orleans 5 p. m., arrive at New York on the second morning at 9:15. To secure a name for this train, a prize of $200 is offered by the railroads interested. Write to W. H. Tayloe, passenger traffic manager of the Southern Railway, Washington, D. C.

Kansas Industrial Court Reports on Shopcrafts Strike

The shopcrafts strike, which began in July, 1922, is no longer a factor in the transportation situation in Kansas, according to the formal report of the Industrial Court of Kansas to the governor of that state. The railroads successfully overcame the trouble and resumed normal operations months ago, the report states. The first official strike figures applicable to Kansas show that six months after the beginning of the strike the roads were employing 1,524 more men in the shops than had been working on the day preceding the walkout, and that the facilities for handling the heavy traffic were under no handicap as a result of the strike.

The court's summary of the strike indicates that on the first day of the walkout the tieup in the shops was 70 per cent complete. In twenty days it had decreased to 40 per cent, and on September 3 to 80 per cent of normal. A month later the strike had completely broken down. On June 30, 1922, the day before the strike, the railroads in Kansas were employing 12,362 men in their shops; on the first work-day following the strike, 3,574; on August 4, 7,061, and at the beginning of September, 9,774. On January 1, 1923, these shops were employing 13,886 men, or 1,524 more than in June.

In breaking the strike, the railroads were compelled to bear an expense of $2,958,216 for maintenance and expense of employees, bonus payments, guards and police protection and other forms of compensation above the regular schedule. The striking men lost a total of $6,157,672 in wages. Only a few of the strikers are now idle, nearly all having returned to their jobs.

The charge that the transportation system in the state had been broken down by the strike was refuted by the court's investigation. The report shows that in December the ton mileage on railroads in Kansas was 500,000,000 greater than in December, 1921.

Requirements for Admission to Officers' Reserve Corps

The plan for the organization of the railway units of the army reserve authorized in the Army Reorganization Act of June 4, 1920, and described in the *Railway Age* of March 17, page 775, requires that applicants for appointment in the Officers' Reserve Corps in time of peace, must be between the ages of 21 and 60 years at the time of appointment and must be citizens of the United States or the Philippine Islands. In time of war this law provides that except that for temporary increased grades for regular army officers, all officers shall be appointed from the officers' reserve corps. Appointments are made for a period of five years unless terminated sooner at the discretion of the President. The qualifications of an applicant for appointment in the corps are determined in three ways. Former emergency or retired regular army officers, are judged according to their records. Persons qualifying as graduates of reserve officers' training camps, as

flying cadets, etc., are admitted according to the records shown. Applicants will also be admitted upon personal examination.

All classes of applicants except national guard officers, flying cadets, and R. O. T. C. officers should apply to the corps area or department commander. Persons federally recognized as officers of the national guard on June 4, 1920, may be appointed in the officers' reserve corps in the same grade and rank in which they were federally recognized on that date, or in any lower grade. A national guard officer on the active list should forward his application to the adjutant general of his state or the chief of the militia bureau. Appointments of former officers in the infantry, cavalry, field artillery, post artillery and air service sections are limited under the act to a grade equal to or lower than the one held while in service. An application should be accompanied by a report of a physical examination.

Under the act, the President may order a reserve corps officer to active duty with any of the military forces of the United States at any time for any period, but excepting time of a national emergency, expressly designated by Congress, no reserve officer will be employed on active duty for more than 15 days in one calendar year without his consent. Pay while on active duty will be the same as in the regular army, but there is no provision for pay while in inactive status.

Further details concerning the reserve army are given in a memorandum issued by the adjutant general on January 27, 1922.

Papers for Purchases and Stores Meeting

The Purchases and Stores Division of the American Railway Association will hold its fourth annual meeting at Chicago, May 15-17, the headquarters being at the Hotel Sherman. The sessions will be held in the convention hall of the hotel, convening at 9:30 a. m., city time, on Tuesday, May 15. The subjects of the committee reports and papers to be presented are as follows: Stores Department Book of Rules (Chairman W. D. Stokes, Illinois Central); Classification of Material (Chairman W. L. Hunker, Chicago, Rock Island & Pacific); Reclamation and Conservation of Discarded Material and Classification of Scrap (Chairman A. S. McKelligon, Southern Pacific); Material Accounting and Office Appliances (Chairman G. A. Secor, Chicago & Alton); Forest Products (Chairman W. A. Summerhays, Illinois Central); Stores Department Buildings and Facilities for Handling Material (Chairman R. C. Harris, Pennsylvania System); Workable Rules in Connection with the Carrying Out of the Provisions of Section 10 of the Clayton Anti-Trust Act (Chairman E. A. Clifford, Atchison, Topeka & Santa Fe); Supply Train Operation and Line Delivery of Material (Chairman O. Nelson, Union Pacific); Joint Committee on Fuel Conservation (Chairman S. Porcher, Pennsylvania System); Joint Committee on Joint Inspection of Standard Material (Chairman M. J. Collins, Atchison, Topeka & Santa Fe); Unit Piling of Material and Numerical Marking System (Chairman J. L. Sullivan, Union Pacific); Purchasing Agents' Office Records and Office Organization (Chairman C. E. Walsh, Pennsylvania System); Committee on General Accounting (Chairman H. H. Laughton, Southern Railway); Store Delivery of Material to Users at Shops (Chairman H. R. Duncan, Chicago, Burlington & Quincy); Nominating Committee (Chairman F. A. Bushnell, Great Northern); Most Economical Method of Handling Repairs to Typewriters, Calculating Machines and Other Office Appliances, W. W. Griswold, stationer, Chicago, Rock Island & Pacific; Reclamation of Grain Doors, Oliver Maxey, general supervisor claim prevention, Chicago, Rock Island & Pacific; Savings to Be Effected in the Handling of Paints, Oils and Similar Products by the Use of the Metal One-Time Shipping Container, J. C. Kirk, assistant general storekeeper, Chicago, Rock Island & Pacific; The Railway Stores Catalogue, C. D. Young, general supervisor of stores, Pennsylvania System; The Need of Apprentices in the Storehouse Organization, J. W. Gerber, general storekeeper, Southern Railway.

Wage Statistics for 1922

The wage bill of the railroads for 1922 was $2,669,180,772, according to a statistical summary issued by the Interstate Commerce Commission as a consolidation of the monthly summaries issued during the year, with certain minor corrections. The number of employees ranged from 1,545,040 in February to 1,820,463 in November and decreased to 1,788,590 for December.

The recapitulation by groups of employees is as follows:

Group	Employees: Average number at middle of month	Employees: Per cent of total	Service hours (or days): Average number of full-time positions	Service hours (or days): Straight time actually worked	Service hours (or days): Overtime paid for	Service hours (or days): Total preceding columns	Compensation: Basis	Compensation: Straight time actually worked	Compensation: Per cent of total compensation	Compensation: Daily or hourly earnings	Compensation: Overtime paid for	Compensation: Per cent of total compensation	Compensation: Daily or hourly earnings	Compensation: Other compensation	Compensation: Total
I. Executives, officials and staff assistants	15,502	0.94	15,481	4,874,704	1,548	4,876,252	Daily basis	$77,614,240	99.57	$15.92	$16,273	(*)	$10.51	$322,216	$77,952,729
II. Professional, clerical and general.	48,980 232,274	17.10	48,276 224,469	14,982,412 561,484,378	149,371 17,467,810	15,131,783 578,952,188	Daily basis Hourly basis	101,008,527 316,943,478	93.71	6.74 .56	792,355 10,348,906	2.50	5.30 .59	1,778,423 15,132,704	103,579,355 342,425,088
III. Maintenance of way and structures.	4,591 358,197	22.05	4,585 344,251	1,461,135 848,338,473	2,290 39,837,008	1,463,425 888,175,481	Daily basis Hourly basis	12,944,289 352,506,702	94.95	8.86 .42	16,225 18,840,408	4.90	7.09 .47	56,397 530,001	13,016,911 371,877,111
IV. Maintenance of equipment and stores.	15,337 439,976	27.68	15,304 417,889	5,006,230 1,051,295,898	26,390 107,454,515	5,032,620 1,158,750,413	Daily basis Hourly basis	44,285,559 614,151,618	87.73	8.85 .58	201,610 82,977,763	11.08	7.64 .77	426,335 8,492,552	44,913,504 705,621,933
V. Transp'n (other than train, eng. and yard).	25,928 178,784	12.44	25,758 174,353	9,073,434 460,163,284	147,946 22,090,480	9,221,380 482,253,764	Daily basis Hourly basis	29,391,060 243,543,534	94.63	3.24 .53	389,313 13,187,055	4.71	2.63 .60	106,446 1,792,246	29,886,819 258,522,835
VI (a). Tr'sp'n (y'dm's, switch tend's & hostl's)	6,042 17,550	1.43	5,979 17,122	2,101,494 47,940,454	13,707 1,779,378	2,115,201 49,719,832	Daily basis Hourly basis	17,748,686 29,065,704	94.64	8.45 .61	111,267 1,461,982	3.18	8.12 .82	665,311 414,397	18,525,264 30,942,083
VI (b). Transp'n (train and engine service).	302,083	18.36	260,808	682,500,197	99,327,645	781,827,842	Hourly basis	502,398,459	74.77	.74	100,679,912	14.98	1.01	68,838,769	671,917,140
All employees	116,380 1,528,864	.....	115,383 1,438,892	37,499,409 3,651,722,684	341,252 287,956,836	37,840,661 3,939,679,520	Daily basis Hourly basis	282,992,411 2,058,609,495	87.73	7.55 .56	1,527,043 227,496,026	8.58	4.47 .79	3,355,128 95,200,669	287,874,582 2,381,306,190
Total number of employees and compensation	1,645,244	.....	1,554,275	.....	.....	.....	.....	2,341,601,906	.....	.....	229,023,026	.....	.....	98,555,797	**2,669,180,772

*Less than one. *Does not include $12,073,582 reported as bonuses to employees for loyal service.

Traffic News

The New York State Barge Canals will be opened for business on May 1.

The St. Louis-San Francisco is distributing a booklet which describes the Ozark Mountain region. The book is called "Summer Playgrounds of the Southwest."

The Chicago, Burlington & Quincy will establish an additional passenger train between Chicago and Denver, Colo., on May 27. The train will be operated on a 27-hour schedule in both directions.

The Chicago & North Western will establish on April 29 a new train, to be known as the Viking, which will leave Chicago at 10:25 a. m. and arrive at Minneapolis at 10:50 p. m. This will give the Chicago & North Western five daily trains each way between Chicago and the Twin Cities.

It appears that "lady shipping agents" solicit business for the Canadian Pacific Steamship and Railway Lines in England; at any rate, 50 persons, described by this title, were entertained by the steamship company on the steamship "Montrose" at Liverpool recently. These agents were from all parts of the United Kingdom.

Plans to Move Box Cars West

Definite plans to bring about a reserve car supply west of the Mississippi river, in anticipation of the demands that will come this season for the movement of crops, were made at a meeting of transportation officers of the Eastern and Southern railroads with the Car Service Division of the American Railway Association, at Washington, on April 10. The plans call for a systematic program on the part of the carriers as a whole and the Car Service Division has issued an order the effect of which will be to bring about the movement westward of all box cars of western ownership which are now east of Chicago and St. Louis.

All railroads east of Chicago and the Mississippi are prohibited from holding box cars belonging to western roads for prospective loading and from moving such cars, either loaded or empty, in an opposite direction from the home line.

A Frank Explanation

A motor transportation line using the highways of New York and Pennsylvania as its principal asset advertises that it "inherits all the advantages of the railroads *without their heavy first investment costs. It does not have to buy right-of-way.* There are no ties, no rails to lay, no grading to do, no hills to cut down, no valleys to fill, no bridges or trestles to erect."

This, says a circular recently issued by the Buffalo, Rochester & Pittsburgh, should be in the hands of every taxpayer. "To carry it a step further, they might have mentioned that their taxes would be at a practical minimum; while, as every taxpayer knows, the railroads average the largest individual assessment in each community and are consequently at great expense to maintain state highways for the benefit of their competitor." Continuing, the circular says:

"After a winter of unusual severity our highways are in a badly damaged condition, pitted with holes and ruts, a condition, according to our state engineers, caused by chains on the wheels of heavy motor trucks. Trucks use only one chain on each rear wheel, and when this chain hits the surface with a hammer blow of a five-ton truck above it, there can be no doubt as to the cause of road damage.

"The railroad is by law obliged to have a definite number of men to a train. No such law covers motor traffic. Two men could easily manage a motor truck caravan and run it 24 hours a day with no 16-hour law to observe.

"The motor law of Indiana for 1923 provides among other classifications that automobiles transporting passengers or freight shall be taxed as follows: from 3½ to 5 tons' capacity, $125 yearly license; from 5 to 7½ tons' capacity, $175; from 7½ or over tons' capacity, $250.

Commission and Court News

Interstate Commerce Commission

The commission has announced a hearing at Chicago on June 20 in its investigation into the reasonableness of the surcharge for Pullman passengers. The hearing will be before Commissioner Campbell and Examiner Keeler.

The commission has issued a decision in the case of the Adriatic Mining Company, et al., vs. Chicago & North Western, et al., in which it holds that the rate on iron ore, including charge for dock service from the Mesabi, Vermillion and Cuyuna ranges in Minnesota to vessels at Two Harbors and Duluth, Minn., and Allouez Bay and Superior, Wis., are not unreasonable. The commission finds, however, that the line haul rates on iron ore from the Gogebic range and the Menominee and Marquette ranges to Escanaba, Mich., are unreasonable to the extent that they exceed 72 cents per gross ton and that the line haul rates from Marquette Range to Marquette, Mich., are unreasonable to the extent that they exceed 54 cents from mines at Ishpeming and Negaunee, Mich., and 63 cents from other mines.

State Commissions

The Public Service Commission of West Virginia has issued a general order calling for a general revision of freight tariffs, the result of which is expected to be a reduction, although no estimate has been published as to the extent of the change. The order covers all of the steam railroads of the state, with the exception of certain divisions or sections, and requires them to put the new rates in effect not later than July 1. The rates are based on "scale No. 1" and "scale No. 2," as proposed in a report issued by the Trunk Line Association on September 23, last; and connecting lines must establish and maintain with each other reasonable joint rates on each class. The Ohio River Railroad, operated by the Baltimore & Ohio, is not included, the rates of this line being based on those of the Central Freight Association. The Chesapeake & Ohio and the Norfolk & Western are ordered to adopt joint rates on sand and gravel, in certain territory, by May 15. There are a number of other special orders of this nature.

Court News

Railroad Not Liable for Explosion of Torpedo

The Vermont Supreme Court holds that where a fireman placed one of the torpedoes kept in the locomotive cab on the track to carry out a practical joke, and the engineer, knowing this, ran the engine over the torpedo, the railroad company was not liable to another employee for injuries caused by the explosion, the acts of the fireman and engineer not being within the scope of their employment.—Goupiel v. G. T. (Vt.), 118 Atl. 586.

Right of Way Used as Railroad Yard Not Assessable for Street Improvements

The New York Supreme Court, Equity Term, Cayuga County, holds that a strip of land six rods wide, acquired for a right of way, and used for a railroad yard, is not assessable for street improvements; "right of way" includes tracks or land used as a railroad yard.—Lehigh & New York v. City of Auburn, 196 N. Y. Supp. 118.

Railroad Not Insurer of Wholesomeness of Food

The Georgia Court of Appeals holds that a railroad company which runs dining cars on passenger trains is not an insurer of the wholesomeness of the food served therein, and in case of injury to a patron from the consumption of deleterious food so furnished is liable only where there was a failure to exercise reasonable care in respect to its quality and preparation.—Rowe v. L. & N. (Ga. App.), 113 S. E. 823.

Supreme Court of the United States

Assessment Against Railroads in Drainage District Held Invalid

The Supreme Court of the United States has affirmed the judgment of the Circuit Court of Appeals, Eighth Circuit, (277 Fed. 708) holding unduly discriminatory an assessment by a drainage district of Arkansas of 6 per cent of the assessed value of the property of the railroads within the district, which placed 57 per cent of the burden of taxation on the railroads and 43 per cent on the owners of all the other real estate in the district. The court rejects as wholly resting on prophecy the argument that in course of time the aggregate of the taxes levied on each piece of property would be adjusted so as to correspond to the benefits received, adding that: "The best that can be said of the scheme of taxation (so far as it concerns the railroad) is that the burdens imposed will grow less as its ability to bear them grows greater."

The railroads affected are the Kansas City Southern and the Texarkana & Fort Smith.—Thomas v. K. C. S.. Decided April 9, 1923. Opinion by Justice Brandeis.

Attorney's Lien Where Director General Has Compromised Claim

The Supreme Court of the United States holds that where the director general has settled a claim for injury and death occurring while a railroad was under federal control, under which the railroad would probably have been liable in damages under the Federal Employers' Liability Act had the company been operating the railroad at the time, the attorney for the claimant cannot enforce, against the railroad company, a lien under his contract with such claimant for fifty per cent of all moneys received and under the Missouri statute making a defendant settling without the consent of plaintiff's attorney liable for such attorney's lien. The claim was for the death of a brakeman. The evidence showed that the railroad company had nothing to do with the settlement.

The Supreme Court holds that whatever claim the administratrix had for the deceased's injury and death was against the director general, not the company. Her attorney's lien, if he had one, was on that claim. The settlement of the claim was strictly an act of the director general done in the course of federal control. No liability could attach to the company for that act consistently with section 10 of the Federal Control Act and General Order No. 50. Elliott v. Wabash, 208 Mo. App. 348, giving judgment for the attorney's claim against the company is reversed.—Wabash v. Elliott. Decided April 9, 1923. Opinion by Justice Van Devanter.

Constructing Temporary Barracks Under Implied Agreement

The Supreme Court of the United States has affirmed the decree of the Court of Claims dismissing the petition of the Baltimore & Ohio, under the Dent Act, for compensation for constructing temporary barracks for the use of United States troops under an "implied agreement" alleged to have been entered into with the United States, in December, 1917, through the Expeditionary Quartermaster of the War Department at Locust Point, Md., acting under the authority of the Secretary of War. The court holds that an essential element in the establishment of the company's claim was lacking, since none of the government officials at Locust Point had any authority to order the construction of a temporary barracks. "The findings of fact showed that Col. Kimball (Expeditionary Quartermaster) did not order the construction of the barracks, which was voluntarily undertaken by the company, without saying anything whatever about compensation, apparently from its own desire to provide for the comfort of the troops, who were guarding its property as well as that of the Government, after it had removed the wrecking train which it had offered to supply as their quarters. It does not appear that Col. Kimball requested the construction of the barracks; that the company intimated that it would expect payment from the Government, or that Col Kimball suggested that such payment would be made; or that the company in fact expected compensation."—Baltimore & Ohio v. United States. Decided April 9, 1923. Opinion by Justice Sanford.

Foreign Railway News

China Notes

PEKING

President Li Yuan Hung has recently announced in an interview that a startling change in policy with respect to the manner of railway construction had been adopted by the government. He said:

"We have come to the conclusion that the entire system of making big railway loans is wrong. The policy is to be definitely abandoned. The loans are squandered by our own officials and the foreign concessionaires are not as careful of our interests as they might be. The policy we now propose to follow is a system of tenders for materials and contracts for work by railroad contractors. Our own capital resources being insufficient we must have foreign co-operation, and we shall seek it in this new way.

"We look upon the present railway impasse as purely temporary. It is a remarkable fact worth noting, that the Belgo-Dutch company building the Hsianfu (Lung-Hai) railway is pushing ahead and will complete its work in one or two years. What they can do, others can do—if they were genuine in their intentions."

In less concise language, the President is reported to have explained that when the amounts involved run into millions and a foreign concessionaire is made both banker and builder, no system of control can protect all interests with equal impartiality.

If the few lines built under direct Chinese supervision be compared with those built under foreign concessions, the President's remarks concerning protecting Chinese interests appear to have some justification, so far as mere cost of construction is concerned. But very few observers would agree that the present "railway impasse" is to be of short duration. The most optimistic seem to think that reorganization may be forced in a year or two, and that this might bring about a speedy recovery. But at best, the President's plan means piecemeal construction. None of the present lines can purchase materials for such purposes before their present matured liabilities are discharged. Lines like the Peking-Hankow, Peking-Suiyuan and Tientsin-Pukow, whose revenues can be commandeered, and have been, by the government whenever it needs funds, will be utterly unable to enter upon any projects, except under very special conditions arranged very carefully in advance by people who take the trouble to be thoroughly familiar with the details of the situation. On the other hand, those lines upon which the revenues are deposited in the Hongkong & Shanghai Bank, for example, as fast as they are collected—such lines will be able to figure very prominently in the contract and tender plan of operations.

The Peking-Mukden, the Shanghai-Nanking, the Shanghai-Hangchow-Ningpo and the Canton-Kowloon all deposit their funds in this one bank. The net revenue from these combined lines affords quite a nucleus by which British contractors can be protected. There may be no significance in the news, but Jardine and Matheson have just announced the formation of the firm to be known as the Jardine Engineering Corporation, to take over the engineering work of the parent firm. The firm of Jardine, Matheson & Company is associated with the Hongkong & Shanghai Bank in the formation of the British & Chinese Corporation—the agents which have made practically all the loans to the Chinese government for railway purposes in the past, and whose manager is the British representative of the consortium in China.

Japanese banks have the custody of the revenues of two short but profitable government railways and a French bank has custody of another short but profitable railway. Aside from this it appears that the British have the only means of actually securing themselves on the "tender and contract" basis. Others will have to take the long chance or else resort to very clever negotiation.

"EFFICIENT RAILWAY OPERATION," the elaborate work by Colonel Henry S. Haines, published in 1919, is being translated by the Japanese Government for the benefit of the officers of the Japanese Railways.

Equipment and Supplies

Locomotives

YNGENIO, SANTA FE, C. POR A. SAN DOMINGO has ordered two Consolidation type locomotives from the Baldwin Locomotive Works.

THE KANSAS CITY SOUTHERN, reported in the *Railway Age* of April 14 as inquiring for 10 2-8-8-2 Mallet type locomotives, has ordered this equipment from the American Locomotive Co.

THE FLORIDA EAST COAST, reported in the *Railway Age* of April 14 as inquiring for 15 Pacific type locomotives and 5 0-6-0 type switching locomotives, has ordered 15 Mountain type and 5 switching type locomotives from the American Locomotive Company.

Freight Cars

THE ATCHISON, TOPEKA & SANTA FE contemplates buying about 2,000 refrigerator cars.

THE NORFOLK & WESTERN contemplates coming into the market soon for some freight cars.

THE FLORIDA EAST COAST is inquiring for 200 flat cars and 200 ventilator box cars, also for 10 caboose cars.

THE ELGIN, JOLIET & EASTERN has ordered 80 underframe reinforcements from the Illinois Car & Equipment Company.

THE UNION PACIFIC is inquiring for material to build 50 steel underframe, 8-wheel caboose cars in its shops at Albina, Oregon.

THE JOHNSTOWN COAL & COKE COMPANY, Johnstown, Pa., has ordered 150 hopper cars of 55 tons' capacity from the American Car & Foundry Company.

THE BERTHA COAL COMPANY, reported in the *Railway Age* of April 21 as inquiring for 200 hopper cars, has ordered 300 hopper cars of 55 tons' capacity from the Pressed Steel Car Company.

THE ATLANTIC COAST LINE, reported in the *Railway Age* of March 31 as inquiring for from 450 to 500 gondola cars, has ordered 450 gondola cars from the Virginia Bridge & Iron Company.

THE UNITED STATES FUEL COMPANY, reported in the *Railway Age* of April 7 as inquiring for 500 hopper cars of 70 tons' capacity, has ordered this equipment from the General American Car Company.

THE MATHESON ALKALI WORKS, New York, reported in the *Railway Age* of March 24 as inquiring for 40 tank cars, has ordered from the Standard Steel Car Company 25 special cars for hauling chlorine.

THE HOCKING VALLEY, reported in the *Railway Age* of April 7, as asking for bids on 2,000 automobile box cars has reduced its inquiry to 1,000 steel frame single sheathed automobile box cars of 40 tons' capacity and is asking for bids on 1,000 cars until 12 o'clock noon May 2, at Richmond, Va.

Passenger Cars

THE ATLANTIC COAST LINE has ordered five dining cars from the Pullman Company.

THE FLORIDA EAST COAST is inquiring for 15 steel baggage cars, 2 mail cars and 1 dining car.

THE ATCHISON, TOPEKA & SANTA FE is inquiring for 50 express refrigerator cars of 40 tons' capacity.

THE ARMS-YAGER RAILWAY CAR COMPANY has ordered 50 cars for passenger service, from the Pullman Company.

THE NATIONAL RAILWAYS OF MEXICO have ordered five narrow gage passenger coaches from the Pullman Company.

THE LOUISVILLE & NASHVILLE, reported in the *Railway Age* of March 17 as inquiring for ten coaches, has ordered this equipment from the American Car & Foundry Company.

Iron and Steel

THE BOSTON & MAINE is inquiring for 500 tons of bridge steel.

THE BUFFALO, ROCHESTER & PITTSBURGH has ordered 300 tons of structural steel from the American Bridge Company.

THE DELAWARE, LACKAWANNA & WESTERN has placed an order for 1,000 tons of structural steel with the American Bridge Company

THE GREAT NORTHERN is in the market for 1,450 tons of structural steel door frames and chutes and 800 tons of steel ore spouts for delivery early in 1924.

THE ILLINOIS CENTRAL has ordered 600 tons of structural steel from the American Bridge Company and 370 tons from the Virginia Bridge & Iron Company.

THE CHICAGO, BURLINGTON & QUINCY has ordered 188 tons of structural steel for a bridge over the Platte river, south of Omaha, Neb., from the Missouri Valley Bridge & Iron Company.

Machinery and Tools

THE CENTRAL OF NEW JERSEY is inquiring for a radial drill, also for two engine lathes.

THE INTERNATIONAL-GREAT NORTHERN is inquiring for 15 machine tools, of which 10 are engine lathes.

THE INTERNATIONAL-GREAT NORTHERN has ordered one 120-ton wrecking crane from the Industrial Works.

Miscellaneous

THE NEW YORK CENTRAL will receive bids until 12 o'clock noon, May 4, for the manufacture, delivery and installation of one 2,000 kw. rotary converter and one 2,100 kv.a. transformer with switchboard and auxiliary equipment and electrical connections.

Signaling

THE CANADIAN NATIONAL, Central region, has ordered 62 light signals and 280 d. c. relays, together with switch circuit controllers, switch indicators, etc., from the Union Switch & Signal Company for use in the installation of three-color light automatic block signals on 38 mi. of the Grand Trunk, between Toronto, Ont., and Hamilton, double track. Installation will be by the railway company's forces.

THE CENTRAL OF GEORGIA has ordered from the Union Switch & Signal Company 141 semaphore signals, style "S" direct current, one-arm, three-position, upper quadrant, for installation between Fort Valley, Ga., and Albany, together with 508 d. c. relays, 245 Universal switch circuit controllers and the other apparatus for the complete signaling of this stretch of 77 mi. of single track. The installation will be carried out by the railway company's forces.

THE SOUTHERN has awarded a contract to the General Railway Signal Company for the installation of automatic train control on 38 miles of double track between Ludlow, Ky., and Williamstown. This section of track is a part of the main line between Cincinnati and Chattanooga and the automatic train control is to operate in connection with existing alternating current visual automatic block signals. The intermittent inductive type of tapered control is to be used with from one to three pairs of inductors approaching each block section. There are now 70 automatic signals within the 38-mile section. These are operated by power furnished by a 4,400-volt transmission line.

Supply Trade News

The Chicago Railway Equipment Company has moved its general sales office to 500 Railway Exchange building, Chicago, Ill.

The Bucyrus Company, Milwaukee, Wis., will erect additions to its machine shop and central manufacturing plant to cost approximately $355,000.

The Standard Railway Equipment Co. and the **Union Metal Products Company** have removed their New York City office from 347 Madison avenue to 247 Park avenue.

The United States Electrical Tool Company, Cincinnati, Ohio, has recently opened a new district office at 430 North High street, Columbus, Ohio, with **E. M. Beeler** as manager, also opened a new district office at 412 First street, National-Soo Line building, Minneapolis, Minn., with **Thomas H. Caley** as manager.

The Standard Scale and Supply Corporation, Pittsburgh, Pa., has bought and is now operating under new management the business formerly carried on by the Standard Scale & Supply Company, Pittsburgh. The new corporation will manufacture high grade scales, concrete mixers and contractors' equipment.

The William E. Kelly Company, dealer in railway specialties, MacCormick building, Chicago, Ill., has been appointed railroad representative of the **Van Dorn Iron Works Co.,** Cleveland, Ohio, for the western, southwestern and northwestern territory, handling that company's complete line of heavy forgings, steel office furniture and equipment.

The Bridgeport Brass Company has removed its New York City offices from the Woolworth building to the Pershing Square building, Park avenue between Forty-first and Forty-second streets. **F. Morton Clark** has been appointed district sales manager and **Arthur J. Nelson** has been appointed sales manager of the fabricating division at the main office in Bridgeport, Conn.

Allen B. Coffman has resigned as sales engineer of the Crouse-Hinds Company, to become manager of the Philadelphia district for the **Reliance Electric & Engineering Co.,** Cleveland, Ohio, manufacturers of electric motors. Mr. Coffman's headquarters in Philadelphia are in the Reliance Electric & Engineering Co.'s office in the Perry building, Sixteenth & Chestnut streets.

A plan to issue $30,000,000 of 7 per cent cumulative preferred stock and to change the company's authorized common stock from 1,200,000 shares of $25 par value into the same number of shares of no par value, has been approved by stockholders of the **Inland Steel Company,** Chicago. It is planned to issue at once $10,000,000 of the new preferred stock and 166,540 additional shares of the common stock, which will make a total of 1,182,799 shares outstanding.

The Chausse Oil Burner Company, with offices at 206 Lincoln building, Detroit, Mich., has been incorporated for $100,000, to manufacture oil burning hand torches used by track and signal forces for thawing snow and ice around switches and signaling apparatus. The officers of the company are: **W. McK. White,** president; **W. G. Chausse,** vice-president, and **Wray T. White,** secretary. Plans are being made to locate a factory in or near Detroit.

The Sanford Riley Stoker Company, Worcester, Mass., and the **Ground Coal Engineering Company** formerly of Chicago, have formed a corporation for the manufacture and installation of pulverized coal apparatus to be known as the **Ground Coal Engineering Corporation** with headquarters at Worcester, Mass. **R. Sanford Riley,** who is also president of the Riley Stoker Co. is president of the new corporation and **M. W. Arrowood** is vice-president and executive engineer.

W. W. Darrow, vice-president of the **Camel Company,** with headquarters at Chicago, has been promoted to president, succeeding Percy M. Elliott, deceased. Mr. Darrow was born on August 29, 1882, at Ft. Atkinson, Wis., and in July, 1901, he entered the employ of the Camel Company as a bookkeeper. In 1903 he was promoted to secretary, which position he held until January 1, 1918. On the latter date he was promoted to vice-president, which position he has held until his recent promotion. **Hugh E. Creer,** assistant to the vice-president in charge of sales of the Camel Company, with headquarters at Chicago, has been promoted to vice-president. Mr. Creer was born on August 10, 1874, at Hardin, Mo., and entered railroad service in 1898 in the car department of the Missouri Pacific. In 1905, he entered the employ of the Pere Marquette in the car department, where he remained until 1910, when he returned to the car department of the Missouri Pacific. In 1911, he entered the employ of McCord and Company as a salesman, with headquarters at Chicago, which position he held until 1916. On the latter date he enterd the employ of the Camel Company in the same capacity, with headquarters at Chicago, and in May, 1917, he was promoted to assistant to vice-president in charge of sales, which position he has held until his recent promotion. **A. B. Wegener,** secretary of the Camel Company, with headquarters at Chicago, has been appointed secretary and treasurer. Mr. Wegener was born at St. Paul, Minn., and entered the employ of the American Bridge Company, with headquarters at Chicago, in 1900. He held various positions with this company until 1908, when he was promoted to credit manager, which position he held until 1912. On the latter date he entered the employ of the Camel Company as a salesman, with headquarters at Chicago, which position he held until January 1, 1916, when he was promoted to general manager of sales. He held this position until 1917, when he was promoted to secretary, which position he has held until his recent appointment.

W. W. Darrow

H. E. Creer

A. B. Wegener

Court of Appeals Renders Decision in Patent Suit Involving Corrugated Steel Car Ends

The United States Circuit Court of Appeals for the Seventh Circuit has modified the decree of the District Court in the suit of the Pressed Steel Manufacturing Company, Chicago, and Walter P. Murphy, against the Mt. Vernon Car Manufacturing Company, Mt. Vernon, Ill., for patent infringement. An account of the decision of the lower court in this case appeared in the January 28, 1922, issue of the *Railway Age* on page 292. The patents involved are the Murphy-Sisson patent No. 1,031,571, claims 11, 12, 14 and 15; Sisson reissue patent No. 14,434, claims 9, 12 and 43; Murphy patent No. 1,058,889, claim 5; Sisson patent No. 1,271,234, claim 1; and Sisson patent No. 1,254,860, claims 2, 3, 4, 5 and 6. In that suit the District Court decided in favor of the plaintiff that all of the claims of these patents involved in the suit were valid and had been infringed by the Mt. Vernon Car Manufacturing Company in equipping 1,000 box cars for the Baltimore & Ohio, with corrugated steel plate ends furnished by the Chicago-Cleveland Car Roofing Company, and issued an order for a permanent injunction and an accounting as to profit and damages against the defendant company. The decision of the Circuit Court of Appeals modifies the decree of the lower court by relieving the defendant from the injunction and accounting under the disputed claims of patents No. 1,058,889, No. 1,271,234, and claims 9 and 12 of reissue patent No. 14,434. So modified, the decision of the lower court is affirmed. The Court of Appeals says: "Each side shall pay one-half of the costs in this court."

Obituary

Percy M. Elliott, president of the Camel Company, Chicago, and vice-president of the Ryan Car Company, whose death on April 18 at the Henrotin Memorial Hospital, Chicago, was reported in the *Railway Age* of April 21, was born at Paris, Ill., on February 13, 1870. After finishing his education he came to Chicago and was employed as an accountant until 1900, when he entered the employ of the Monarch Brake Beam Company, now a part of the Chicago Railway Equipment Company, as a salesman, with headquarters at Chicago, which position he held until June, 1902, when he entered the employ of the Camel Company, in the same capacity. He remained in this position until 1906, when he was promoted to general manager which position he held until January 1, 1916, when he was promoted to vice-president. On January 1, 1918, he was promoted to president which position he was holding at the time of his death.

P. M. Elliott

Dr. Schuyler Skaats Wheeler, president of the Crocker-Wheeler Company of New York and Ampere, N. J., died suddenly on April 21, at his home in New York City. Dr. Wheeler was well known for his inventions of electric appliances and motors. He was born in New York City in 1860 and was educated at Columbia College, from which he graduated in 1881. After leaving college he was employed as assistant electrician in the American branch of the Jablochkoff Electric Light Company. Later he became associated with the United States Electric Light Company, with which he remained until he became one of Edison's engineering staff in 1883. Dr. Wheeler left the Edison Company in 1886 and for two years was connected with the C. & C. Motor Company, which he helped to organize, with Charles G. Curtis and Francis B. Crocker. In 1888, the Crocker-Wheeler Company was formed with Dr. Wheeler as president.

Railway Construction

ATLANTIC COAST LINE.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of two 500-ton three track, reinforced concrete automatic electric locomotive coaling plants, at Florence, S. C., and Rocky Mount, N. C.

ATCHISON, TOPEKA & SANTA FE.—This company plans the construction of new locomotive and car shops at Kansas City, Kan., to cost approximately $250,000.

BOSTON & MAINE.—This company has awarded a contract to the Pittsburgh Wood Preserving Company, Pittsburgh, Pa., for the construction of a two-cylinder tie treating plant at Nashua, New Hampshire, with a capacity of 1,200,000 ties per annum.

CALGARY & FERNIE.—This company will construct a line 50 mi. long from Sparwood, B. C., to Mount Wilson. The construction of this road was begun in 1912, but was discontinued at the beginning of the war. The total length of the projected line is 157 mi., and will cost approximately $3,500,000. Franklin Crandell, Calgary, Alta., is one of the directors of the company.

CANADIAN PACIFIC.—This company has awarded a contract to Stewart & Cameron, Winnipeg, Man., for grading the branch line from Naicam, Sask., to Melfor, as reported in the *Railway Age* of March 31. The company has also awarded a contract to W. A. Dutton, Winnipeg, for grading the new branch line from Cutknife, Sask., to Battle River.

CHICAGO & NORTH WESTERN.—This company is calling for bids for the construction of a 10-stall roundhouse and additions to the shops at Casper, Wyo., which will cost $80,000.

CHICAGO, BURLINGTON & QUINCY.—This company plans as a part of its construction program for this year the construction of 30 miles of second track, including some realinement to cost $2,200,000; the enlargement of yards to cost $800,000; the construction of shops, roundhouses and engine terminals to cost $1,300,000; the construction of water and coaling stations to cost $350,000.

CHICAGO, INDIANAPOLIS & LOUISVILLE.—This company is calling for bids for the construction of a new freight station at Indianapolis, Ind.

CHICAGO, MILWAUKEE & ST. PAUL.—This company plans the construction, jointly with the Chicago, St. Paul, Minneapolis & Omaha and the Great Northern, of a reinforced concrete and steel viaduct over the tracks of these companies at Tenth street, Sioux Falls, S. D. The viaduct is expected to cost approximately $140,000.

CHICAGO, NORTH SHORE & MILWAUKEE (ELECTRIC).—This company will construct new car shops at Waukegan, Ill., to cost approximately $1,000,000. The present shops at Highwood, Ill., will be discontinued after the completion of the new facilities at Waukegan.

DETROIT, TOLEDO & IRONTON.—This company has begun the construction of a double track line 14 mi. long from its main line at Flat Rock, Mich., to the plant of the Ford Motor Company at River Rouge, Detroit. A large classification yard will also be built at River Rouge.

HOUSTON & TEXAS CENTRAL.—This company plans the construction of a cut-off 8½ miles long, connecting the tracks east of Dallas, Tex., with those running south.

ILLINOIS CENTRAL.—This company's application for authority to build a new single track line from Edgewood, Ill., via Metropolis to Fulton, Ky., reported in the *Railway Age* of February 3, was the subject of a hearing at Cairo, Ill., on April 11, before an examiner of the Interstate Commerce Commission. Citizens of Cairo, Centralia and other towns protested against the construction of the new line on the ground that it would result in the diversion of trains which now run through those cities. C. H.

Markham, president of the road, testified that while this would be true, to some extent, the interest of economic transportation of the whole territory served by the railroad justified the step. Every town in the districts traversed by the present line and by the proposed line is actively taking part in the controversy. In spite of the assurances of Mr. Markham that the new line will be used exclusively for freight, the opposition has steadily gained force. At the same time the towns on the proposed new line have organized extensively to support the project. Both sides intend to carry the matter to the courts if necessary.

ILLINOIS CENTRAL.—This company has awarded a contract to the Ellington Miller Company, Chicago, for the construction of the brick passenger station at Anna, Ill., as reported in the *Railway Age* of March 17. Another contract has been awarded to the same company for alterations to a turntable at Memphis, Tenn., which will cost $15,000. The company has also awarded a contract to Joseph E. Nelson & Sons, Chicago, for alterations to the passenger station at Kankakee, Ill., as reported in the *Railway Age* of February 17.

KENTUCKY & INDIANA TERMINAL.—This company plans the enlargement of the yards and additions to the shop facilities at Louisville, Ky., to cost $2,000,000.

LEHIGH & NEW ENGLAND.—This company has adopted plans for modern and adequate facilities for the handling of locomotives and trains in the Panther creek valley between Hauto, Pa., and Tamaqua, Pa., in which are located the anthracite collieries served by it. The plans provide for a new yard and engine terminal to be located near Tamaqua, Schuylkill county, Pa., at an estimated cost of approximately $465,000, and include besides track work a 10-stall roundhouse, an 85-ft. turntable, a 200-ton capacity coaling station, two ash-pits, an oil-house and equipment, a water tank, a car repair shop and a yard office building. A contract has been awarded to the H. Denburger Contracting Company, Bethlehem, Pa., for the grading, concrete masonry, drainage and track laying (including change of creek channel), excavating and the building of the concrete foundation for turntable, excavating and putting in ash-pit foundations, and building concrete abutments on new location of crossings of Panther creek by the railroad's tracks and a private road, at an estimated cost of $126,000.

NEW YORK, CHICAGO & ST. LOUIS.—This company has announced a construction program for this year which includes 39 mi. of second track to cost $1,218,000; 11 mi. of yard and passing tracks to cost $300,000; improvements to shop and engine-houses to cost $242,000 and the construction of a coaling station to cost $15,000. The elimination of a number of grade crossings at a cost of $732,000 is also planned.

PACIFIC ELECTRIC.—This company has prepared plans for the construction of a complete subway system at Los Angeles, Cal. The company has also prepared plans for the construction of a double track subway, 4,200 ft. long from Hill street station to First street and Glendale boulevard, Los Angeles.

PENNSYLVANIA.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of a coaling and cinder handling plant at Clarks Tank, Ohio.

PENNSYLVANIA.—Extensive additions and improvements to this company's yard facilities at Mingo Junction, Ohio, three miles south of Steubenville, have been authorized and will be pushed to conclusion as rapidly as practicable. An expenditure of $514,000 is involved. The new facilities will include five tracks in the eastbound receiving yard, five tracks in the eastbound classification yard, eight tracks in the industrial yard, and five tracks in the eastbound repair yard, having a combined capacity of 1,360 cars. In addition there will be a new track scale with mechanical hump, a caboose yard, a car repair shop, oil room, machine shop, store-room, and a 50,000 gallon water tank.

PONCA CITY OIL FIELD RAILROAD.—This company has applied to the Interstate Commerce Commission for a certificate authorizing the construction of a line from a connection with the Atchison, Topeka & Santa Fe at Ponca City to a connection with the Chicago, Rock Island & Pacific at Billings, Okla., 34 miles.

PORTLAND TERMINAL.—This company has awarded a contract to the Roberts & Schaefer Company, Chicago, for the construction of a gravity sand plant with beamer dryers, at Portland, Me.

Railway Financial News

ALABAMA GREAT SOUTHERN.—*Equipment Trusts Authorized.*—The Interstate Commerce Commission has granted this company authority to guarantee $2,850,000 of 5 per cent equipment trust certificates to be sold at not less than 97 and interest to J. P. Morgan & Co., New York, the proceeds to be applied to the purchase of 4 locomotives, 1,000 coal cars, 800 box cars and one dining car at a cost of $3,673,650, under a lease from Edward T. Stotesbury. The certificates will be dated April 2 and will mature in 15 equal annual installments of $190,000 each, the first installment being payable April 1, 1924.

ATCHISON, TOPEKA & SANTA FE.—*Annual Report.*—The annual report for the year ended December 31, 1922, issued Wednesday, shows net corporate income of $34,382,371 as compared with $39,331,662 in 1921. The income statement follows:

	1922	1921
Freight revenue	$158,026,370	$160,217,450
Passenger revenue	48,644,529	52,594,551
Mail, express and miscellaneous	18,453,645	16,113,069
Total operating revenues	225,124,544	228,925,070
Maintenance of way and structures	36,183,241	31,734,122
Maintenance of equipment	51,069,933	52,472,941
Traffic	3,900,057	3,748,700
Transportation	71,122,570	80,283,618
Total operating expenses	166,904,378	173,217,915
Net operating revenue	58,220,166	55,707,154
Railway tax accruals	18,395,512	14,836,268
Railway operating income	39,755,962	40,793,568
Net railway operating income	40,003,402	41,268,307
Compensation under federal control		3,175,149
Other income	6,723,387	7,906,452
Gross income	46,726,789	52,349,909
Miscellaneous tax accruals	46,508	225,828
Rent for leased roads and other charges	426,655	839,417
Interest on bonds	11,871,255	11,953,002
Net corporate income	34,382,371	39,331,662
Dividends on preferred stock (5 per cent)	6,208,685	6,208,685
Dividends on common stock (6 per cent)	13,605,660	13,518,420
Sinking and other reserve funds	112,662	119,542
Surplus carried to profit and loss	14,455,363	19,485,014

CAROLINA, CLINCHFIELD & OHIO.—*Equipment Trust Authorized.*—The Interstate Commerce Commission has authorized this company to issue $500,000 of equipment trust certificates.

CHESAPEAKE & OHIO.—*Equipment Trust Authorized.*—The Interstate Commerce Commission has authorized this company to assume obligation and liability in respect of $7,875,000 of equipment trust certificates to be issued by the Guaranty Trust Company of New York and to be sold at not less than 96.46.

CHICAGO, ATTICA & SOUTHERN.—*Authorized to Issue Securities.*—The Interstate Commerce Commission has authorized this company to issue 10,000 shares of common stock without par value, to procure the authentication and delivery of $1,500,000 of first refunding mortgage bonds, to issue at par $110,700 of second mortgage bonds, to assume obligation and liability in respect of some notes, and to sell $1,105,000 of first refunding mortgage 6 per cent bonds at not less than 85 for the purpose of acquiring a line of railroad extending from La Crosse, Ind., to a connection with the Chicago, Indiana & Western, and to make additions and betterments thereto. This is part of a line abandoned by the Chicago & Eastern Illinois.

DELAWARE, LACKAWANNA & WESTERN.—*Annual Report.*—The annual report issued this week shows a surplus for the year ended December 31, 1922 of $342,997 as compared with $5,647,827 in 1921. A selection of the principal items in the income account follows:

	1922	1921	Increase or Decrease
Coal revenues	$14,294,191	$26,606,299	—$12,312,108
Freight revenues	37,262,516	36,970,445	202.071
Passenger revenues	13,960,681	14,438,161	—477,481
Total operating revenues	74,622,344	85,977,815	—11,355,471
Maintenance of way and structures	7,882,540	10,022,415	—2,139,875
Maintenance of equipment	18,583,608	19,053,845	—370,236
Traffic	1,349,689	1,305,321	44,368
Transportation	33,242,097	34,819,694	—1,577,598
General	1,872,164	2,039,185	—167,021
Total operating expenses	63,671,647	67,872,058	—4,200,411
Net revenue from operation	10,950,697	18,105,757	—7,155,060

Less railway tax accruals	4,894,466	5,312,066	—417,600
Operating income	6,046,287	12,781,395	—6,735,108
Gross income	16,848,062	25,990,749	—9,142,687
Total deductions	10,475,929	19,158,403	—8,682,475
Dividends declared	10,132,932	13,510,576	—3,377,644
Balance, surplus	342,997	5,647,827	—5,304,831

EL PASO & SOUTHWESTERN.—*Authorized to Issue Bonds.*—This company has been authorized by the Interstate Commerce Commission to issue $5,055,000 of joint and refunding mortgage 5 per cent bonds to be exchanged for first mortgage bonds which mature on January 1.

FORT DODGE, DES MOINES & SOUTHERN.—*Dividend Declared.*—This company has declared a quarterly dividend of $1.75 a share on the preferred stock, payable May 1 to stockholders of record April 14. Previous to this declaration, the last dividend on the preferred was paid in scrip on May 1, 1921. The directors did not consider the 12¼ per cent accumulation on the preferred.

ILLINOIS CENTRAL.—*Annual Report.*—This company's annual report for 1922 is reviewed in an article on another page of this issue entitled "Illinois Central Shows Record Gross and Net." See also excerpts from annual report on adjacent pages.

KEOKUK & DES MOINES.—*Protective Committee.*—Representatives of the preferred stockholders of the Keokuk & Des Moines, with the exception of the Chicago, Rock Island & Pacific, have elected a protective committee, consisting of Herbert H. Clark, of Henry I. Clark & Co.; Henry Zuckerman, of Henry Zuckerman & Co., and Albert Seligsberg, of Seligsberg & Co., with Alphonse Shelare, of the latter company, secretary, and James I. Franc, counsel. Josiah H. Clark is treasurer. Deposit of stock will not be asked for at present. The committee is asking for a ratable contribution toward expenses of $1 a share from stockholders.

MAHONING COAL RAILROAD.—*20 Per Cent Extra Dividend.*—This company has declared an extra dividend of 20 per cent or $10 a share on the common stock, payable May 9 to stock of record of May 5. On December 29 an extra dividend of $15 was paid.

For several years this stock has paid dividends of 50 per cent, or $25 a share, except that in 1920 total payments were 115 per cent, or $55 a share. Only $1,500,000 par value of common stock is outstanding, of which the New York Central owns $894,600. The road is leased to the Central for 40 per cent of its gross earnings, which have largely increased since the making of the lease.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—*Six Months' Guaranty Certified.*—The Interstate Commerce Commission has issued a certificate stating the amount of this company's guaranty for the six months following the termination of federal control as $1,543,961, of which $193,961 remained to be paid.

NEW YORK, CHICAGO & ST. LOUIS.—*Asks Authority for Consolidation.*—This company on April 21 filed an application with the Interstate Commerce Commission for authority to issue $105,000,000 of stock and for a certificate of public convenience and necessity authorizing its acquisition and operation in interstate commerce of the lines of railroad of the New York, Chicago & St. Louis; the Chicago & State Line; the Lake Erie & Western; the Fort Wayne, Cincinnati & Louisville, and the Toledo, St. Louis & Western railroads. The applicant is a corporation formed by the consolidation under the laws of New York, Pennsylvania, Ohio, Indiana and Illinois of these corporations, which have joined in an agreement and articles of consolidation under state laws, which agreement has been approved by a vote of more than two-thirds of all the outstanding stock of each and has been filed with the secretary of state of each of the states involved. The application will thus raise the question as to the attitude to be taken by the Interstate Commerce Commission toward a consolidation effected under state laws, as by statute in each state all of the property, rights, privileges and franchises of each of the five companies are now merged in the consolidated corporation, which proposes and seeks authority of the commission to issue its capital stock in exchange for the outstanding stock of the constituent companies. The application states that none of the railroads involved are substantially competitive but are complementary to and supplemental to each other, and from the standpoint of physical situation and traffic handled the properties logically lend themselves to unified ownership and operation. They are now and for some time have been in a common control and their unification for single operation, the application states, will result in substantial economies with respect to management and operation and will enable them to compete more effectively with the larger systems serving the same territory and give improved service to the public. Authority is asked for the issuance of 327,200 shares of 6 per cent preferred stock and 462,479 shares of common stock in exchange for all the issued capital stock of the five companies. Authority is also asked to nominally issue 131,600 shares of preferred stock and 133,721 shares of common stock to be sold from time to time at par for capital corporate purposes. The new company will operate 1,695 miles of road, reaching the important industrial centers and gateways of Buffalo, Cleveland, Toledo, Detroit, Fort Wayne, Indianapolis, Peoria, St. Louis and Chicago. The articles of consolidation provide for the following officers for the first year or until others are elected: O. P. Van Sweringen, chairman of the board; J. J. Bernet, president; W. L. Ross, senior vice-president, and W. A. Colston, vice-president and general counsel, with offices at Cleveland, Ohio.

RICHMOND, FREDERICKSBURG & POTOMAC.—*Annual Report.*—The annual report issued this week shows net railway operating income of $2,543,648, an increase of $1,268,191 over 1921. A selection of the principal items in the income account follows:

	1922	Increase or Decrease
Freight revenue	$5,519,673	$450,313
Passenger revenue	3,572,573	—4,759
Total operating revenues	10,975,812	973,736
Maintenance of way and structures	1,252,449	—253,508
Maintenance of equipment	1,458,207	—228,755
Traffic	94,786	—1,031
Transportation	3,882,449	—175,202
Total operating expenses	7,234,904	—624,101
Net revenue from railway operations	3,740,908	1,597,837
Railway tax accruals	632,490	230,924
Total operating income	3,107,632	1,366,704
Gross income	3,676,184	1,552,294
Total deductions from gross income	1,581,273	442,872
Net income	2,094,911	1,109,422
Income applied to sinking and other reserve funds	300,000	300,000
Income balance	1,794,911	809,422
Net railway operating income	2,543,648	1,268,191

ST. LOUIS SOUTHWESTERN.—*Asks Authority for Equipment Trust.*—This company has applied to the Interstate Commerce Commission for authority for the issuance of $2,700,000 of 5½ per cent equipment trust certificates which have been sold at 98.64.

UTAH TERMINAL.—*Authorized to Operate Line.*—The Interstate Commerce Commission on rehearing has reversed its previous finding and issued a certificate authorizing this company to operate a railroad in Carbon County, Utah, built to serve coal mines.

WESTERN PACIFIC.—*Equipment Trust Authorized.*—The Interstate Commerce Commission has vacated its previous order granting authority to this company to issue $5,500,000 of first mortgage bonds at the request of the company and has authorized it to assume obligation and liability in respect of $5,600,000 of equipment trust certificates to be sold at not less than 97¼.

YAZOO & MISSISSIPPI VALLEY.—*Authorized to Issue Bonds.*—This company has been authorized by the Interstate Commerce Commission to issue $1,058,000 of 5 per cent gold improvement bonds to be delivered to the Illinois Central in reimbursement for advances.

Dividends Declared

Alabama & Vicksburg.—3½ per cent, payable April 16.

Atlanta & West Point.—3 per cent, semi-annually, payable June 30.

Fort Dodge, Des Moines & Southern.—Preferred, $1.75, quarterly, payable May 1, to holders of record April 14.

Mahoning Coal Railroad.—Common, 20 per cent, extra, payable May 9 to holders of record May 5.

Reading Company.—1st preferred, 1 per cent, quarterly, payable June 14 to holders of record May 28.

Vicksburg, Shreveport & Pacific.—Preferred, 5 per cent, payable April 16.

Trend of Railway Stock and Bond Prices

	April 24	Last Week	Last Year
Average price of 20 representative railway stocks	65.98	66.83	65.99
Average price of 20 representative railway bonds	82.88	82.83	86.62

Annual Report

Illinois Central Railroad Company—Seventy-third Annual Report

To the Stockholders of the Illinois Central Railroad Company:

The Board of Directors herewith submits the following report of the operations and affairs of your company for the year ended December 31, 1922.

The number of miles of road operated as of December 31, 1921, was 4,799.37
The number of miles operated as of December 31, 1922, was.... 4,784.64
The average number of miles of road operated during the year was. 4,784.52

INCOME

A summary of the income for the year ended December 31, 1922, as compared with the previous year is stated below:

	1922	1921	Increase+ Decrease—
Average miles operated during year	4.784.52	4,799.37	—14.85
Railway operating revenues:			
Freight (including bridge tolls and miscellaneous freight)	$119,849,020.19	$107,092,090.55	+$12,756,929.64
Passenger (including bridge tolls and miscellaneous passenger)	24,264,250.53	24,740,350.62	—476,100.09
Mail	2,158,420.02	2,505,671.37	—347,251.35
Express	3,570,474.46	2,326,832.50	+1,243,641.96
Other passenger train	1,029,237.60	880,517.13	+148,720.47
Other transportation	1,709,548.75	1,413,524.02	+296,024.73
Incidental and joint facility	2,279,435.91	2,168,079.52	+111,356.39
Total railway operating revenues	$154,860,387.46	$141,127,065.71	+$13,733,321.75
Railway operating expenses:			
Maintenance of way and structures	$20,538,117.07	$22,437,587.08	—$1,899,470.01
Maintenance of equipment	36,236,119.65	34,591,449.68	+1,644,669.97
Traffic	2,314,554.49	1,887,711.35	+426,843.14
Transportation	55,934,968.78	53,603,439.42	+2,331,529.36
Miscellaneous operations	997,772.66	1,009,049.13	—11,276.47
General	3,606,447.59	3,679,022.95	—72,575.36
Transportation for investment —Cr.	Cr. *498,710.92*	Cr. *355,926.57*	—142,784.35
Total railway operating expenses	$119,129,269.32	$116,852,333.04	+$2,276,936.28
Net revenue from railway operations	35,731,118.14	24,274,732.67	+11,456,385.47
Railway tax accruals	11,208,967.28	8,119,035.45	+3,089,931.83
Uncollectible railway revenues	15,413.11	24,318.81	—8,905.70
Railway operating income	$24,506,737.75	$16,131,378.41	+$8,375,359.34
Equipment rents—net credit	725,590.81	1,614,026.69	—888,435.88
Joint facility rent—net debit	111,200.64	203,177.54	—91,976.90
Net railway operating income	$25,121,127.92	$17,542,227.56	+$7,578,900.36
Non-operating income	4,104,464.81	5,039,238.05	—934,773.24
Gross income	$29,225,592.73	$22,581,465.61	+$6,644,127.12
Deductions from gross income	13,135,916.81	12,880,671.47	+255,245.34
Net income	$16,089,675.92	$9,700,794.14	+$6,388,881.78
Disposition of net income:			
Income appropriated for investment in physical property	$34,786.13	$44,519.31	—$9,733.18
Total appropriations of income	$34,786.13	$44,519.31	—$9,733.18
Income balance transferred to credit of profit and loss	$16,054,889.79	$9,656,274.83	+$6,398,614.96

NOTE—To afford a proper comparison of the income for the two years, the results for 1921 have been restated by omitting from "Railway Operating Expenses" credits, and from "Deductions from Gross Income" charges, amounting to $6,854,541.96, due to cancellation of Guaranty Period maintenance reserves in that year.

RAILWAY OPERATING REVENUES

"Railway Operating Revenues" amounted to $154,860,387.46 this year as compared with $141,127,065.71 last year, an increase of $13,733,321.75, or 9.73 per cent.

There was an increase of $12,756,929.64, or 11.91 per cent, in "Freight Revenue," due to the larger volume of traffic handled, offset in part by decreases in rates during the year, a considerable proportion of which was due to a ten per cent reduction ordered by the Interstate Commerce Commission, effective July 1, 1922. The tons of revenue freight carried one mile were 14,151,817,246, an increase of 3,067,723,286 ton miles, or 27.68 per cent, as compared with last year. The average rate per ton per mile was .847 cent, a decrease of .119 cent, or 12.32 per cent, compared with last year. There was a substantial increase in the tonnage of practically all classes of commodities transported, particularly bituminous coal, building materials, forest products, asphaltum and refined petroleum and its products. There was a material decrease in the tonnage of wheat.

"Passenger Revenue" for the current year decreased $476,100.09, or 1.92 per cent, as compared with the previous year. There was a decline in the volume of through passenger traffic, but a substantial increase in the Chicago suburban traffic. As a consequence, there was registereed an increase in the number of revenue passengers carried one mile of 5,518,060, or 0.68 per cent, and a decrease in the average revenue per passenger per mile of .079 cent, or 2.59 per cent, due to the lower rates prevailing for Chicago suburban traffic as compared with the through traffic.

There was a decrease of $347,251.35, or 13.86 per cent, in "Mail Revenue," due in part to the inclusion in the "Mail Revenue" for the previous year of a portion of the back mail pay for 1916 to 1919, inclusive, awarded under an order of the Interstate Commerce Commission in December, 1919, and in part to a reduction in mail pay owing to the Post Office Department's arrangement for the transportation of mails between railway stations and post offices at a number of stations along the line of road, a service previously performed by your company.

The increase of $1,243,641.96, or 53.45 per cent, in "Express Revenue," was due to the increased volume of express business handled.

RAILWAY OPERATING EXPENSES

"Railway Operating Expenses" amounted to $119,129,269.32 this year, as compared with $116,852,333.04 last year, an increase of $2,276,936.28, or 1.95 per cent. For the purpose of suitable comparison of the railway operating expenses for the two years; there has been eliminated from the figures of last year a credit of $6,854,541.96, of which $2,744,697.84 was credited to "Maintenance of Way and Structures Expenses" and $4,109,844.12 was credited to "Maintenance of Equipment Expenses," in connection with the cancellation of reserves for maintenance because the Interstate Commerce Commission, in an order dated December 15, 1921, prescribed a different method for adjusting maintenance expenses of the Guaranty Period.

The decrease of $1,899,470.01, or 8.47 per cent, in "Maintenance of Way and Structures Expenses" was primarily on account of decreased wages, reductions in costs of materials and supplies used and a decrease in the renewal of bridge and switch ties due to the inability to secure full requirements.

The increase of $1,644,669.97, or 4.75 per cent, in "Maintenance of Equipment Expenses" was on account of increased depreciation charges by reason of additional equipment acquired, an increase in charges for equipment retired and additional expenses incurred by reason of labor troubles.

There was an increase in "Traffic Expenses" of $426,843.14, or 22.61 per cent, due in part to heavier outlays for advertising, to a larger volume of tariffs issued during the year and to increased forces of the Traffic Department, including outside soliciting agencies.

There was an increase of $2,331,529.36, or 4.35 per cent in "Transportation Expenses" primarily due to an increase in freight service on account of a greater volume of traffic transported this year as compared with the previous year.

There was a decrease of $11,276.47, or 1.12 per cent, in "Miscellaneous Operations."

The decrease of $72,575.36, or 1.97 per cent, in "General Expenses," was due primarily to decreases in salaries and expenses of clerks and attendants, valuation expenses, stationery and printing, and other expenses, which were offset in part by increases in law expenses and pensions.

The decrease in expenses by reason of the increase of $142,784.35 in "Transportation for Investment—Credit" was on account of the increase in the volume of construction work carried on during the year.

RAILWAY TAX ACCRUALS

"Railway Tax Accruals" amounted to $11,208,967.28 this year, as compared with $8,119,035.45 last year, an increase of $3,089,931.83, or 38.06 per cent. The increase was due to increased Federal income taxes caused by an increase in the tax rate from 10 per cent to 12½ per cent of the taxable income; to an increase in taxable income by reason of the increased volume of business during the year and the inclusion in taxable income of the amount allowed in the Federal Control settlement for undermaintenance, materials and supplies, etc., and by additional accruals for 1917 income taxes in connection with the filing of consolidated returns for that year as required by the Act of Congress passed in 1921. There was also a substantial increase in the Illinois charter tax due to increased earnings on charter lines this year as compared with last year.

NONOPERATING INCOME

"Nonoperating income" this year amounted to $4,104,464.81, as against $5,039,238.05 last year, a decrease of $934,773.24. This decrease was due to $113,270.44 received last year covering additional compensation allowed by the Director General of Railroads in final settlement for the period of Federal Control, whereas there was no similar income during the current year; non-receipt of dividends from the Madison Coal Corporation, whereas $900,000.00 was received last year from this source; a decrease of $124,287.21 in interest on funds on deposits with bankers and others; and a decrease of $387,596.87 in miscellaneous income, the major portion of which was due to the cancellation during the current year of a portion of the Guaranty Period claim under Section 209 of the Transportation Act, 1920, disallowed by the Interstate Commerce Commission in settlement as effected June 27, 1922. These decreases were partly offset by an increase of $291,205.00, consisting mainly of interest received on United States bonds purchased during the year, and interest on additional holdings of The Yazoo & Mississippi Valley Railroad Company's Five Per Cent Gold Improvement Bonds; an increase of $258,732.76 in interest on advances to affiliated corporations, the major portion of which was received from The Yazoo & Mississippi Valley Railroad Company and the Dubuque & Sioux City Railroad Company; and other minor increases of $40,443.52.

DEDUCTIONS FROM GROSS INCOME

"Deductions from Gross Income" amounted to $13,135,916.81 this year, as against $12,880,671.47 last year, an increase of $255,245.34. There has been excluded from the figures for the previous year $6,854,541.96, covering the cancellation of income accrued during 1920 in connection with the Guaranty Period, resulting from the cancellation of reserves for maintenance, referred to under the head of "Railway Operating Expenses" above. The increase for the year consisted in part of rental payments to the Dubuque & Sioux City Railroad Company of $715,648.48, whereas no payment was reported in the previous year; an increase in "Interest on Funded Debt" of $411,943.96 due to the inclusion of interest during the entire year on securities issued last year, and, in addition, interest for portions of the year on securities issued during the current year, less interest on Equipment Trusts and other securities retired, as compared with a part year's interest on securities issued during the previous year, a comparison of which may be made by reference to Table No. 7 of the report this year, and the corresponding table for the previous year; an increase of $406,902.00, covering an adjustment of interest accrued on open accounts with the Director General of Railroads in the previous year, which has been offset in part by a decrease of $84,166.67 in interest paid on loans from banks and trust companies and $8,485.79 in miscellaneous interest charges this year as compared with last year; an increase in "Separately Operated Properties—Loss" and "Miscellaneous Tax Accruals" of $67,063.46; and an increase in other miscellaneous deductions of $1,183.41. The foregoing was partly offset by a reduction of $563,288.02 in deficit in "Net Railway Operating Income" for the Guaranty Period, as fully explained in the report for last year, and a decrease of $691,555.49, resulting from the assumption by your Company of a deficit of $383,477.42 from the operations under the lease of the Dubuque & Sioux City Railroad last year, repaid to the extent of $308,078.07 this year.

CAPITAL STOCK AND FUNDED DEBT

At your annual meeting, held in Chicago on April 19, 1922, you authorized an issue of $50,000,000.00 par of preferred shares for the purpose of providing funds for the electrification of your company's lines within Chicago; the reconstruction of its principal passenger station and freight terminals, the improvement of lands acquired under contract ordinance with the City of Chicago, passed July 1, 1919, and for other lawful purposes, such preferred shares to be issued in series and to be entitled to dividends at a rate not exceeding 7 per cent per annum non-cumulative and convertible into common shares as shall be determined from time to time by the Board of Directors. In accordance with the foregoing, the Board of Directors at a meeting held April 27, 1922, authorized the issue of $10,929,600.00 par of Six Per Cent Convertible Preferred Shares, Series "A." The preferred shares were subscribed and paid for in full and dividends began to accrue thereon as of June 26, 1922. During the year preferred shares of the par value of $208,300.00 were converted into common shares.

Illinois Central Equipment Trust Certificates, Series "H," amounting to $3,255,000.00 were issued and sold February 1, 1922.

Illinois Central Equipment Trust Certificates, Series "I," amounting to $6,645,000.00 were issued and sold October 1, 1922.

Obligations under equipment contract with The Pullman Company, amounting to $1,748,500.00, were issued to that company January 17, 1922.

Under the terms of the Illinois Central Railroad Company and Chicago, St. Louis & New Orleans Railroad Company Joint First Refunding Mortgage there were issued to your company in June, 1922, $1,924,400.00 Five Per Cent Bonds, Series "A," in reimbursement for improvements made to the mortgaged properties. Under the same mortgage, $8,500.00 par value of Series "A," or Dollar Bonds, were issued in exchange for £1,700 Sterling Bonds, the equivalent of $8,245.00 of Series "B," or Sterling Bonds, upon payment of the difference of $255.00 in cash.

Under the terms of the trust agreement $296,000.00 Illinois Central Railroad Company One to Fifteen Year Secured Gold Notes matured and were retired.

There were retired and canceled under the terms of the respective trust agreements Illinois Central Equipment Trust Certificates, Series "A," $800,000.00; Series "B," $350,000.00; Series "C," $198,000.00; Series "D," $190,000.00; Series "E," $550,000.00; Chicago, St. Louis & New Orleans Railroad Company Equipment Trust Certificates, Series "A," $570,000.00; Government Equipment Trust No. 33, $647,100.00; and under the equipment contract with The Pullman Company, $66,495.00, a total of $3,371,595.00.

SECURITIES OWNED

There were purchased during the year $2,017,200.00 par value United States Second Liberty Loan Four and One-quarter Per Cent Bonds of 1927-1942; $5,000,000.00 par value United States Third Liberty Loan Four and One-quarter Per Cent Bonds of 1928; $4,000,000.00 par value United States Victory Liberty Loan Four and Three-quarters Per Cent Notes of 1923; $2,000,000.00 par value United States Treasury Four and Three-quarters Per Cent Notes of 1926, Series "A"; and $1,313,000.00 par value United States Treasury Four and One-quarter Per Cent Notes of 1926, Series "B."

There was received from The Yazoo and Mississippi Valley Railroad Company in settlement for advances made for improvements to its property $5,034,000.00 of its Five Per Cent Gold Improvement Bonds.

One million three hundred thirty-eight thousand dollars par value of Tennessee Central Railroad Company Four Per Cent Prior Lien Bonds were charged to "Profit and Loss" as worthless for the reason that the property of the Tennessee Central Railroad Company was sold under foreclosure during the year and it was realized there would be very little remaining for the bondholders from the proceeds of the sale after the various claims of the receivership had been settled.

The Peoria & Pekin Union Railway Company redeemed $12,500.00 par value of its Five Per Cent Debenture Bonds maturing August 1, 1922.

Additions and Betterments—Expenditures

There was expended during the year for "Additions and Betterments" (including improvements on subsidiary properties) $17,742,565.30.

PHYSICAL CHANGES

The following is a summary of the more important improvements during the year, the cost of which was charged wholly or in part to "Road and Equipment":

Additions and Betterments—Road

Work under the "Lake Front Ordinance," passed by the City of Chicago, providing for the reclamation of submerged lands, electrification of the Illinois Central lines within the city, the construction of a new passenger station and facilities at Roosevelt Road and the reconstruction of freight facilities at South Water Street continued throughout the year. The Electrification Commission appointed for the purpose of determining the best system of electrification to be used has recommended, and a 1,500-volt D. C. overhead construction has been adopted. The lowering of tracks between 26th and 45th Street and the elevation of tracks between 45th Street and 51st Street have been started. Changes in city sewers made necessary by the lowering of the tracks have been made. In addition to the foregoing, considerable progress has been made on the plans for the rearrangement preparatory to the electrification of suburban, passenger and freight tracks, the proposed 18th Street railway connection and the new passenger station at Roosevelt Road.

Three hundred thirty-eight company sidings, covering 74.40 miles of track, and 110 industrial sidings were built or extended.

The construction of second main tracks from Scottsburg, Ky., to Princeton, Ky., a distance of 4.02 miles; Eddyville, Ky., to a junction one mile north of Kuttawa, Ky., a distance of .77 mile; and from Clarks, Ky., to Paducah, Ky., a distance of 2.77 miles, was completed.

A third main track from Tucker, Ill., to Kankakee, Ill., a distance of 4.60 miles, was completed. The construction of a third main track from Matteson, Ill., to Peotone, Ill., a distance of 8.24 miles, and on a fourth main track from Matteson, Ill., to Monee, Ill., a distance of 3.21 miles, was practically completed during the year.

Reduction in grades to .3 of 1 per cent on the two north-bound main tracks south of Tucker, Ill., was completed, and similar work through Monee, Ill., was started, the excess filling material being used for separation of grade crossings with the Michigan Central and Elgin, Joliet & Eastern railroads at Matteson, Ill.

New subways eliminating street grade crossings at Main Street and Elliott's Park, Matteson, Ill., were built.

The grading for Markham Yard, located between Harvey, Ill., and Homewood, Ill., referred to in the report of the previous year, was continued.

The erection of a reinforced concrete viaduct to carry McLemore Avenue over the tracks of the Illinois Central and The Yazoo and Mississippi Valley railroads at Memphis, Tenn., referred to in the report of the previous year, was completed.

The construction of a brick freight house and driveways and the conversion of the present freight and passenger station into a passenger station at West Frankfort, Ill., referred to in the report of last year, were completed. A new passenger station at Marissa, Ill., and combination passenger and freight stations at Gilman, Ill., Zeigler, Ill., and Belmont, Miss., were completed. Work was started on the construction of new passenger stations at Mexico, Ky., Mercer, Ky., Glenwild, Miss., and Ponchatoula, La.

Improvements were made to the icing facilities at Centralia, Ill.

The interlocking plant at the crossing with the Waterloo, Cedar Falls & Northern Railway at Waterloo, Ia., referred to in the report of the previous year, was completed. New crossover interlocking plants for three track operation were constructed at Manteno, Ill., and Tucker, Ill. The construction of similar plants at Monee, Ill., and Peotone, Ill. and the electrification of the interlocking plant at Kankakee, Ill., were started.

The erection of a car repair shed at McComb, Miss., referred to in the report of the previous year, was completed. The construction of a 300-ton coal chute at McComb, Miss., and the installation of a train air testing plant at Dubuque, Ia., were begun.

A 62-foot, 200-ton plate fulcrum track scale was installed in the hump yard at Centralia, Ill. Two 60-foot, 150-ton track scales were installed at Clinton, Ill., and one at Paducah, Ky., and work was started on the installation of similar track scales at Kankakee, Ill., Cairo, Ill. and Evansville, Ind.

Improvements were made to the water facilities, of which the major projects consisted of the erection of 100,000-gallon creosoted water tanks at Ramsey, Ill., Pana, Ill., Du Quoin, Ill., Herrin, Ill., Poseyville, Ind., Caneyville, Ky., Princeton, Ky., two 50,000-gallon tanks at Memphis, Tenn. and one 50,000-gallon tank at Parkersburg, Ia.; the construction of water treating plants at Amboy, Ill., La Salle, Ill., Fort Dodge, Ia., Rockwell City, Ia., Wall Lake, Ia., Denison, Ia., Dunlap, Ia., Logan, Ia., Council Bluffs, Ia.; and improvements to the water treating facilities at Scales Mound, Ill., Galena, Ill. and Manchester, Ia. The pumping station at Birmingham, Ala., was electrified.

The extension of automatic block signals south through Paducah, Ky., a distance of 3.6 miles referred to in the report of last year, and the construction of block signals between Fox Run, Ky., and Ilsley, Ky., a distance of 4.2 miles, were completed. Work was begun on the construction of signal bridges with color light signals between Matteson, Ill., and Kankakee, Ill., a distance of 28 miles, replacing lower quadrant semaphore signals, and on the extension of block signals from Fox Run, Ky., to Graham, Ky., a distance of 17 miles. At the close of the year, 2,488.6 miles of track were equipped with block signals.

Five thousand one hundred ninety-two lineal feet of permanent bridges and trestles were constructed, replacing pile and timber bridges and trestles; 132 lineal feet of permanent bridges and trestles and 14,108 linear feet of pile and timber bridges and trestles were rebuilt or replaced by embankment. Twenty-five miles of track were ballasted and brought up to standard, and the embankments were widened on fifteen miles of track preparatory to placing ballast.

Additions and Betterments—Equipment

Ten 8-wheel switching locomotives were added and nineteen locomotives of various types were disposed of, resulting in a decrease of nine locomotives. Forty-three locomotives of various classes were superheated. The increase in tractive power of locomotives for the year was 162,696 pounds.

Eleven passenger cars were retired or transferred to other service.

Five thousand four hundred thirty-five freight cars were added, and 8,488 cars were retired or transferred to other classes, resulting in a net decrease of 3,053 cars.

GENERAL REMARKS

A general revival in business was in evidence during the latter part of the year throughout the territory served by your lines of railroad. The labor unrest, culminating in the strike of the coal miners and later the strike of the railroad shop men, was a disturbing factor that retarded the growth of business. However, with the settlement of the coal strike in August, business gained considerable momentum, and during the balance of the year the traffic handled by your company showed a substantial increase. Due to the heavy expenditures made by your company in recent years to provide for added facilities, including rolling stock, your company was readily enabled to meet the increased public demands for service, and the results attained, as reflected in the income account, showed a decided improvement as compared with the previous year.

On January 3, 1922, an agreement was made with the Director General of Railroads under which your company paid in full settlement of all accounts and claims between the Director General of Railroads and your company, the Chicago, Memphis & Gulf Railroad Company, The Dunleith & Dubuque Bridge Company, and the Central Elevator & Warehouse Company, the sum of $7,750,000.00. After allocating to the Chicago, Memphis & Gulf Railroad Company, the Dunleith & Dubuque Bridge Company, and the Central Elevator & Warehouse Company the amounts accruing to those companies, there remained a credit balance of $9,146,465.08 accruing to your company under the Federal Control settlement covering undermaintenance, the difference between the value of materials and supplies taken over at the beginning and returned at the conclusion of Federal Control, etc. Under the instruction of the Interstate Commerce Commission this amount was credited to "Profit and Loss" and is shown in Table No. 3 on page 17 of this report.

Settlement was effected with the United States on July 27, 1922, for amounts due your company under Section 209 of the Transportation Act, 1920, being for the so-called "Guaranty Period," covering the six months ended August 31, 1920. Under the terms of this settlement the amount allowed was $11,783,256.65, consisting of one-sixth of the test period net railway operating income, $8,155,310.43; one-half of the annual interest provided in Section 4 of the Federal Control Act, $1,117,074.12, which represented an interest return on expenditures for improvements made from July 1, 1917, to February 29, 1920; and an allowed operating deficit during the Guaranty Period of $2,510,872.10.

There were received from The Pullman Company and placed in service during the year 650 refrigerator cars. The cost of this equipment was $1,748,500.00, and the payment therefor was arranged by the execution of an equipment lease agreement with The Pullman Company.

There were contracted for and delivered during the year 350 refrigerator cars and 2,000 gondola cars at an approximate cost of $4,071,500.00. The purchase of this equipment was financed in part by the issue of Illinois Central Equipment Trust Certificates, Series "H," amounting to $3,255,000.00, and the balance was paid for in cash by your company.

Your company contracted for the purchase of 25 Central type freight locomotives, 25 Mikado type locomotives, 15 eight-wheel switching locomotives, and 3,000 50-ton composite coal cars, to cost approximately $8,310,000.00. In order to finance the purchase of this equipment there were issued during the year Illinois Central Equipment Trust Certificates, Series "I," amounting to $6,645,000.00. The balance of the purchase price is payable in cash by your company. There were received and placed in service during the year 10 of the 15 eight-wheel switching locomotives included under this trust.

The number of stockholders as shown on the books of your company at the close of the year was 19,427, of whom 14,776 were holders of common shares and 4,651 were holders of preferred shares. There were 15,175 stockholders last year.

There were 686 pensioners at the close of the year, and the amount of pensions paid during the year was $282,664.36, an increase over the previous year of $22,416.03.

The Board of Directors takes pleasure in expressing its appreciation to the officers and employes for their loyal and efficient services during 1922.

By order of the Board of Directors.

C. H. MARKHAM,
President.

[ADVERTISEMENT]

Railway Officers

Executive

G. R. Huntington, vice-president and general manager of the Duluth, South Shore & Atlantic and the Mineral Range with headquarters at Minneapolis, Minn., has been elected president of these companies with the same headquarters, succeeding **E. Pennington,** who has retired from active service. In addition to his new duties Mr. Huntington will continue in his capacity as president of the Minneapolis, St. Paul & Sault Ste. Marie. **A. E. Wallace,** general manager of the Minneapolis, St. Paul & Sault Ste. Marie with headquarters at Minneapolis, has been appointed vice-president and general manager of the Duluth, South Shore & Atlantic and general manager of the Mineral Range with the same headquarters, succeeding Mr. Huntington. Mr. Wallace will also continue as general manager of the Minneapolis, St. Paul & Sault Ste. Marie.

Operating

M. E. Young has been appointed superintendent of the Rapid City, Black Hills & Western, with headquarters at Rapid City, S. D.

E. E. Wright has been appointed assistant division superintendent of the Middle division of the Michigan Central, with headquarters at Jackson, Mich. **G. H. Meese** has been appointed trainmaster on the Middle division, with the same headquarters. **R. F. Mattix** has been appointed trainmaster on the Western division, with headquarters at Niles, Mich.

D. F. Stevens, whose promotion to general superintendent of the Northwest district of the Baltimore & Ohio, with headquarters at Cleveland, Ohio, was reported in the *Railway Age* of April 21, was born on November 4, 1882, at Minneapolis, Minn. He received his education at Cornell University, where he studied civil engineering. He entered railway service in June, 1899, as a clerk on the Great Northern. Two years later he was engaged as axman for the same company, leaving this work in June, 1902, to become timekeeper on the Canadian Pacific. He returned to the Great Northern in June, 1903, as a rodman, but in May, 1904, entered the service of the Chicago, Rock Island & Pacific as a gang foreman. He was appointed a clerk with this company in December, 1904, and held this position until September, 1905, when he was appointed a roadmaster on the Great Northern. In May, 1907, he returned to the Rock Island for a short time as a gang foreman, but was appointed yardmaster on the New York, New Haven & Hartford in October, 1907. He was promoted to trainmaster in February, 1908, and held this position until October, 1913, when he was promoted to terminal trainmaster. Mr. Stevens entered the service of the Baltimore & Ohio in May, 1914, as assistant supervisor of fuel consumption, and was promoted to trainmaster in November of the same year. He was promoted to assistant superintendent in May, 1915, and in January of the following year was promoted to superintendent of the Newark division. In September, 1918, he was transferred to the Newcastle division, where he remained until April, 1922, when he was transferred to the Akron division. He was serving at this point at the time of his recent promotion to general superintendent of the Northwest district.

D. F. Stevens

J. C. Roth, whose promotion to general superintendent of transportation of the Great Northern, with headquarters at St. Paul, Minn., was reported in the *Railway Age* of March 31, was born at St. Paul, Minn., and entered railway service in 1892, on the Canadian Pacific. He was appointed yard clerk on the Northern Pacific in 1894, and was successively promoted to dispatcher's clerk, assistant chief dispatcher and car distributor. He was promoted to assistant superintendent of transportation, with headquarters at Tacoma, Wash., in July, 1907, and held this position until March, 1912, when he was promoted to superintendent of the North Yakima & Valley Railway, a subsidiary of the Northern Pacific, serving in addition as general agent for the Northern Pacific at North Yakima, Wash. He was promoted to trainmaster of the Northern Pacific, with headquarters at Pasco, Wash., in October, 1914. In June, 1917, Mr. Roth was promoted to assistant general superintendent, with headquarters at Tacoma, and held this position until March, 1918, when he was appointed district manager of the car service section of the Railroad Administration, with headquarters at Portland, Ore. During Federal control he also served as car service assistant of the Northwestern region and terminal manager of the Puget Sound Terminal district. Upon the termination of Federal control on March 1, 1920, he was appointed assistant director of the Bureau of Service of the Interstate Commerce Commission, with headquarters at Washington, D. C., and on June 1, 1922, was promoted to director of the Bureau of Service, with the same headquarters. He was serving in this capacity at the time of his recent appointment as general superintendent of transportation of the Great Northern, with headquarters at St. Paul.

J. C. Roth

Mechanical

J. A. Carmody has been appointed superintendent of electric equipment of the New York Central, succeeding C. H. Quereau, resigned. **A. J. Clarkson** has been appointed general inspector succeeding Mr. Carmody.

H. G. Kastlin, master mechanic of the LaCrosse division of the Chicago, Burlington & Quincy, with headquarters at Grand Crossing, Wis., has been transferred to the Creston division, with headquarters at Creston, Iowa. **C. W. Robertson,** master mechanic of the Creston division, with headquarters at Creston, Iowa, has been transferred to the La Crosse division, with headquarters at Grand Crossing, Wis., succeeding Mr. Kastlin.

Engineering, Maintenance of Way and Signaling

S. A. Seeley has been appointed division engineer of the Adirondack and Ottawa divisions of the New York Central with headquarters at Utica, New York.

G. H. Wilsey, structural engineer of the St. Paul Union Depot Company at St. Paul, Minn., has been appointed principal assistant engineer in charge of the design and construction of the new passenger terminal. **W. B. May** has been appointed assistant engineer in charge of construction.

Obituary

W. L. Lewis, traffic manager of the Elgin, Joliet & Eastern with headquarters at Chicago, died in that city on April 24.

R. W. Blair, general attorney for the Union Pacific, with headquarters at Topeka, Kan., died on April 19. He was 61 years of age and had been associated with the law department of the Union Pacific since 1887.